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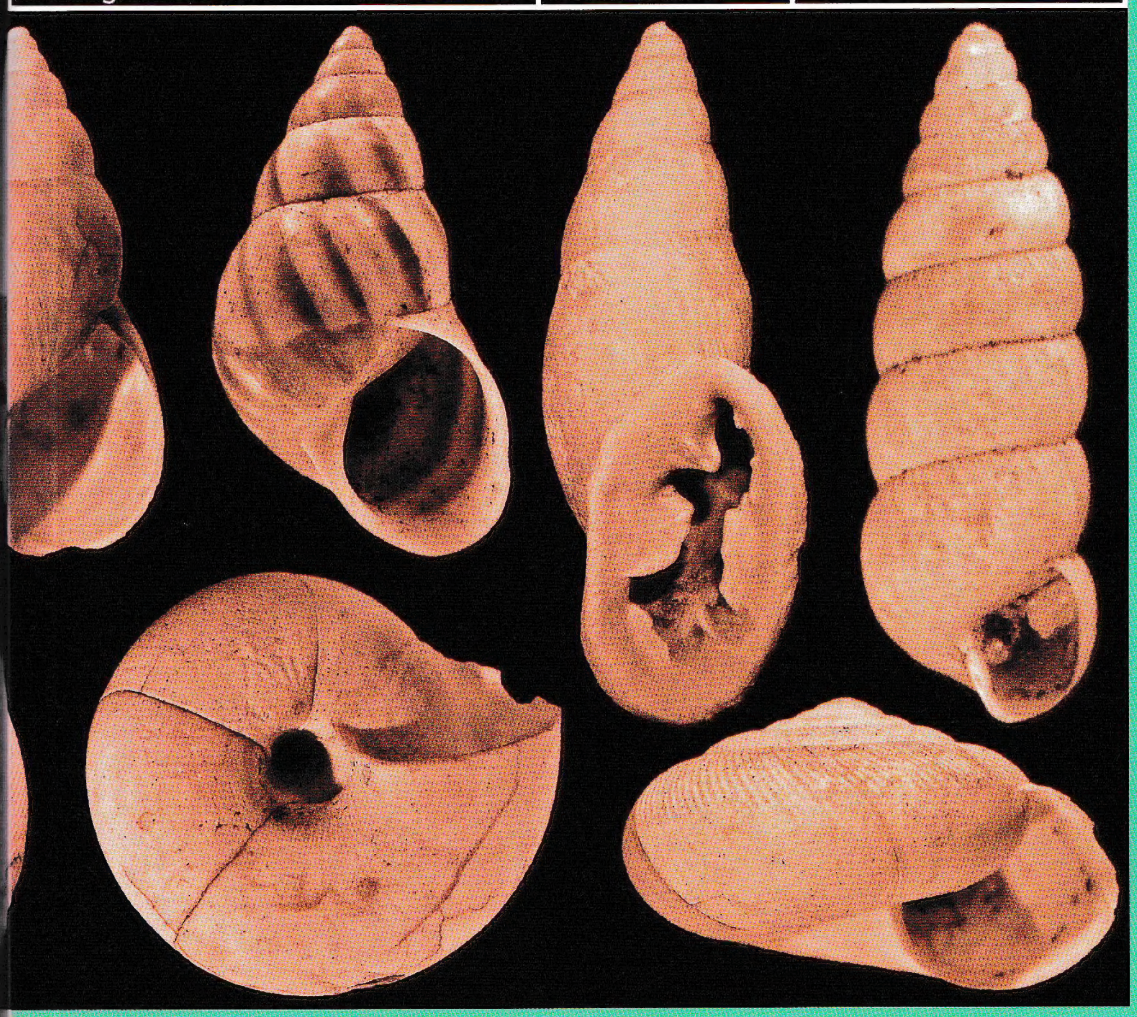

STUTTGARTER BEITRÄGE ZUR NATURKUNDE

A | Biologie

Trachelipus of the eastern Black Sea coast ■ Oriental species of Caenis ■ *Megalopaederus* species of Taiwan ■ Studies on *Stiliderus* and *Stilicoderus* ■ Scaphidiinae of the Moluccas ■ Revision of the Afrotropical genus *Perichilus* ■ Clytrini from Borneo ■ *Andrena taraxaci*-group ■ *Reisserita* in North Africa

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Taxonomical study on a sample of land snails from Alcobaça (Bahia, Brazil), with description of a new species

Rodrigo Brincalepe Salvador & Luiz Ricardo Lopes Simone

Abstract

A sample of land snails, mainly pulmonates, was recently (August 2012) collected in a fragment of Atlantic rainforest, in the vicinity of the city of Alcobaça (south of Bahia state, Brazil); its study is urgent both from a taxonomical as well as from an environmental point of view. The geographical ranges of *Beckianum beckianum* (Subulinidae), and possibly also of *Rectartemon piquetensis* (Streptaxidae), are extended to Bahia. Specimens of *Helicina angulifera* (Helicinidae), *Gastrocopta oblonga* (Gastrocoptidae), *Bulimulus tenuissimus* and *Leiostracus vimineus* (Bulimulidae), and *Burringtonia pantagruelina* (Odontostomidae), already known to Bahia, were also found. Moreover, *Solaropsis alcobacensis* **n. sp.** (Pleurodontidae) is described herein. The finding of this new species is a stark reminder of how little the Brazilian terrestrial snail fauna is known and of how such forest fragments may serve as refuges for endemic species and should therefore be properly preserved.

Keywords: Neritimorpha, Northeast Brazil, Pulmonata, *Solaropsis alcobacensis* new species, Stylommatophora.

Zusammenfassung

Landschnecken, überwiegend bestehend aus Pulmonaten, wurden im August 2012 in einem atlantischen Regenwald-Fragment in der Umgebung der Stadt Alcobaça im Süden des Bundesstaates Bahia in Brasilien gesammelt; das Studium dieser Aufsammlung war sowohl aus taxonomischen wie auch aus ökologischen Gründen wichtig. Die Verbreitungsgebiete von *Beckianum beckianum* (Subulinidae) und möglicherweise auch *Rectartemon piquetensis* (Streptaxidae) werden um Bahia erweitert. Exemplare der bereits von Bahia bekannten *Helicina angulifera* (Helicinidae), *Gastrocopta oblonga* (Gastrocoptidae), *Bulimulus tenuissimus* und *Leiostracus vimineus* (Bulimulidae) sowie *Burringtonia pantagruelina* (Odontostomidae) werden ebenfalls nachgewiesen. Außerdem wird *Solaropsis alcobacensis* **n. sp.** (Pleurodontidae) beschrieben. Der Fund dieser neuen Art ist ein deutlicher Hinweis darauf, wie wenig die brasilianische Landschneckenfauna bekannt ist und wie derartige Waldfragmente als Rückzugsraum für endemische Arten dienen können und daher eines besonderen Schutzes bedürfen.

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1 Introduction

The megadiverse Brazilian Atlantic rainforest has been much exploited and degraded throughout the few centuries of the country's history, being reduced to less than one tenth its original range (Hirota 2011). Nevertheless, even the few remaining forest fragments still hide new discoveries, especially of the scarcely studied terrestrial molluscan fauna. A recent expedition (August 2012) by shell dealer José Coltro Jr. and his team to southern Bahia have brought to our attention interesting local samples of land snails. Part of this material was donated to the collection of the Museu de Zoologia da Universidade de São Paulo (MZSP, São Paulo, Brazil) and is studied here.

As a testament to the incomplete knowledge of the Brazilian fauna, among the animals recovered there is a new species. This paper presents a formal description of this new species and reports the occurrence of other seven species, two of which have their geographical ranges extended. Descriptions of new species from this kind of environment are somewhat urgent, in order to encourage legal protection. According to the Brazilian legislation, a type-locality can more likely become a protected area. Furthermore, better known geographical distributions can further improve arguments for conservation. The present work is part of a wider ongoing project aiming to improve the knowledge on the Brazilian continental malacofauna, the first step of which was the publication of a catalogue (Simone 2006).

Abbreviations of shell dimensions

D	shell greatest width
d	aperture width
H	shell length
h	aperture height

Acronyms of Institutions

ANSP	Academy of Natural Sciences of Philadelphia, USA
LMD	Löbbecke Museum Düsseldorf, Germany
MNHN	Muséum National d'Histoire Naturelle, Paris, France
MZSP	Museu de Zoologia da Universidade de São Paulo, Brazil
NHMUK	Natural History Museum, London, United Kingdom
SMF	Senckenberg Forschungsinstitut und Naturmuseum, Frankfurt am Main, Germany
ZMA	Zoological Museum Amsterdam (now NCB Naturalis), The Netherlands
ZMB	Museum of Natural History, Humboldt University Berlin, Germany

Acknowledgements

We are deeply grateful to José Coltro Jr. (Femorale) for providing the material studied here, to Barbara M. Tomotani (NIOO-KNAW = Netherlands Institute of Ecology, Wageningen, The Netherlands) and Daniel Abbate (MZSP) for the photos (B. M. T.: Figs. 2–4, 6–8, 10–15; D. A.: Fig. 5), and to the following people for providing specimens and/or photos: Silke Stoll (LMD); Virginie Héros (MNHN); Ronald Janssen (SMF); Valesca Lindenberg and Jeroen Goud (NCB Naturalis); Jon Abllet (NHMUK); Christine Zorn (ZMB).

2 Material and methods

The collection locality is ca. 2 km north of the city of Alcobaça, southern Bahia [17°30′10″S 39°11′42″W (road's coordinates; the collection area is immediately adjacent to the road), ~10 m of elevation; Fig. 1], being a small (ca. 2 ha) Atlantic Forest fragment close to the shore, to roads and to the city, and thus subject to much anthropic disturbance. The specimens were randomly collected by handpicking, as the intention of the collectors was commercial rather research-focused. The majority of the collected material is composed of empty shells, almost exclusively of stylommatophoran pulmonates, with the exception of one neritimorph species. The list of material examined follows each species description. Species identification was conducted based on their original descriptions, later revisions and comparison with material (including types whenever possible) housed at the following institutions: ANSP, LMD, MNHN, MZSP, NHMUK, SMF, ZMA, ZMB. The classification scheme used herein follows Bouchet et al. (2005), with the following exception: Gastrocoptidae is considered a distinct family, instead of a subfamily of Vertiginidae (cf. Manganelli & Giusti 2000).

Fig. 1. Map showing the municipality of Alcobaça. – Abbreviations of neighboring states: MA, Maranhão; PI, Piauí; PE, Pernambuco; AL, Alagoas; SE, Sergipe; TO, Tocantins; GO, Goiás; MG, Minas Gerais; ES, Espírito Santo.

3 Systematics

Order Neritimorpha
Family Helicinidae
Genus *Helicina* Lamarck, 1799

Helicina angulifera Wagner, 1910
(Figs. 2–4)

Helicina angulifera Wagner, 1910 in Wagner 1907–1911: 279 (pl. 55, figs. 6–8); Salgado & Coelho 2003: 151; Simone 2006: 35 (fig. 2).

Material analyzed: MZSP 107962 (10 specimens), 107963 (25 shells).

Dimensions (in mm; n = 10): H = 7.2 ± 0.3 (max 7.7, min 6.7), D = 9.8 ± 0.4 (max 10.7, min 9.2).

Type locality: Bahia, Brazil.

Remarks: This species is known only from the state of Bahia (Simone 2006), although a more precise distribution is still a matter for further study. The examined specimens, as well as those figured by Simone (2006: fig. 2) from Ilhéus, Bahia, show more rounded basal and columellar regions of the peristome when compared to the figures from the species' original description. This feature is still under analysis and has not been found in other samples from Bahia. The remaining shell attributes are closely similar, including the angulation of the peripheral carina.

Order Pulmonata
Suborder Stylommatophora
Family Gastrocoptidae
Genus *Gastrocopta* Wollaston, 1878

Gastrocopta oblonga (Pfeiffer, 1852)
(Fig. 5)

Pupa oblonga Pfeiffer, 1852: 69.

Gastrocopta servilis oblonga: Pilsbry 1916–1918: 90 (pl. 17, figs. 9, 14–15).

Gastrocopta oblonga: Salgado & Coelho 2003: 153; Simone 2006: 116 (fig. 347).

Material analyzed: MZSP 107968 (1 shell).

Dimensions (in mm): H = 2.0, D = 1.0.

Type locality: Possibly Bahia, Brazil (PILSBRY 1916–1918).

Remarks: The present specimen agrees well with the description and figures of *G. oblonga* by PILSBRY (1916–1918). The sole exception is the apertural dentition: the present specimen shows only three teeth/lamellae, while *G. oblonga* typically has five. The anguloparietal lamella is strikingly similar, as are the columellar and lower palatal teeth, but both the upper palatal tooth and the basal tooth are lacking. PILSBRY (1916–1918) treats *G. oblonga* as a subspecies of *G. servilis* (Gould, 1843) and among his diagnostic characters he pointed out the weakness of the teeth, with the basal one either usually being very small or completely lacking. *Gastrocopta* is known for great intraspecific variability in the number and strength of apertural barriers and, thus, the present specimen seem to be an example of simple morphological variation in *G. oblonga*, with both smaller teeth lacking. This species is known from Suriname, north and northeastern Brazil, Paraguay, Uruguay and Argentina (PILSBRY 1916–1918, SIMONE 2006).

Family Orthalicidae
Subfamily Bulimulinae
Genus *Bulimulus* Leach, 1814

Bulimulus tenuissimus (d'Orbigny, 1835)
(Fig. 6)

Helix tenuissima D'ORBIGNY, 1835: 11.

Bulimulus tenuissimus: PILSBRY 1897–1898: 64 (pl. 10, figs. 91–92); MORRETES 1949: 146; BREURE 1979: 64; SALGADO & COELHO 2003: 160; SIMONE 2006: 120 (fig. 370).

Material analyzed: MZSP 107966 (10 shells).

Dimensions (in mm; n = 3): H = 19.9 ± 1.8 (max 21.7, min 18.0), D = 10.1 ± 0.6 (max 10.7, min 9.4).

Type locality: Rio de Janeiro, Brazil.

Remarks: *Bulimulus tenuissimus* is broadly distributed, occurring in Suriname, Bolivia, Brazil (north, northeast and southeast regions, including Bahia) and Uruguay (SIMONE 2006). This species is one of the few native orthalicids that has adapted well to urban areas, and has been transported and introduced by man in various localities (even as far as North Carolina, USA, see ROBINSON & SLAPCINSKY 2005). Whether the occurrence of *B. tenuissimus* in Bahia is a natural one or if the species was introduced there is currently impossible to state, but the latter seems more plausible.

Genus *Leiostracus* Albers, 1850

Leiostracus vimineus (Moricand, 1833)
(Fig. 7)

Helix (Cochlogena) viminea MORICAND, 1833: 540 (pl. 1, fig. 5).

Drymaeus (Leiostracus) vimineus: PILSBRY 1899: 95 (pl. 14, figs. 18–20).

Leiostracus vimineus: SALGADO & COELHO 2003: 163; SIMONE 2006: 124 (fig. 388).

Material analyzed: MZSP 107999 (1 shell), 107967 (8 shells).

Dimensions (in mm; n = 4): H = 20.0 ± 1.2 (max 21.2, min 18.9), D = 10.7 ± 0.4 (max 11.1, min 10.1).

Type locality: Bahia, Brazil.

Remarks: *Leiostracus vimineus* is known from the states of Bahia and Rio de Janeiro (SIMONE 2006) and is readily identifiable by the folds on the basal region of its aperture. The present specimens, however, seem to be slightly smaller, with more convex whorls and proportionately larger apertures.

Subfamily Odontostominae
Genus *Burringtonia* Parodiz, 1944

Burringtonia pantagruelina (Moricand, 1833)
(Fig. 8)

Helix (Cochlodina) pantagruelina MORICAND, 1833: 542 (pl. 1, fig. 7).

Odontostomus (Odontostomus) pantagruelinus: PILSBRY 1901–1902: 63 (pl. 8, figs. 82–85).

Cyclodontina (Burringtonia) pantagruelina: PARODIZ 1944: 4; PARODIZ 1962: 454.

Cyclodontina (Pantagruelina) labrosa: FORCART 1947: 59.

Cyclodontina pantagruelina: BAKER 1947: 106.

Cyclodontina labrosa: SALGADO & COELHO 2003: 165.

Burringtonia pantagruelina: SIMONE 2006: 171 (fig. 600).

Material analyzed: MZSP 107961 (2 shells).

Dimensions (in mm; n = 2): H = 56.6, D = 26.2.

Type locality: Brazil; restricted to Bahia by PILSBRY (1901–1902).

Remarks: The genus *Burringtonia* is endemic to the eastern portion of Brazil and the distribution of *B. pantagruelina* comprises three states: Bahia, Espírito Santo and Rio de Janeiro (SIMONE 2006). This is the most common species in the genus and is notable for some variability in the shape and number of apertural barriers (PILSBRY 1901–1902). The specimens from Alcobaça fit well in the species' variation.

Family Subulinidae
Genus *Beckianum* Baker, 1961

Beckianum beckianum (Pfeiffer, 1846)
(Fig. 9)

Bulimus Beckianus PFEIFFER, 1846: 82.

Opeas beckianum: PILSBRY 1906: 189 (pl. 27, figs. 42–46, 54–55); SALGADO & COELHO 2003: 155.

Beckianum beckianum: SIMONE 2006: 187 (fig. 685).

Material analyzed: MZSP 108000 (1 shell), 107969 (21 shells).

Figs. 2–15. Land snails from Alcobaça, Bahia state, Brazil; apical (3, 10, 13), umbilical (4, 11, 14), and apertural (2, 5–9, 12, 15) views. – **2–4**. *Helicina angulifera* (MZSP 107963; D = 9.8 mm). **5**. *Gastrocopta oblonga* (MZSP 107968; H = 2.0 mm). **6**. *Bulimulus tenuissimus* (MZSP 107966; H = 21.7 mm). **7**. *Leiostracus vimineus* (MZSP 107999; H = 21.2 mm). **8**. *Burringtonia pantagruelina* (MZSP 107961; H = 56.6 mm). **9**. *Beckianum beckianum* (MZSP 108000; H = 8.0 mm). **10–12**. *Rectartemon* cf. *piquetensis* (MZSP 107965; D = 21.3 mm). **13–15**. *Solaropsis alcobacensis* n. sp. (holotype; MZSP 107964; D = 33.2 mm).

Dimensions (in mm; n = 4): H = 7.6 ± 0.6 (max 8.1; min 7.0), D = 2.5 ± 0.2 (max 2.6; min 2.3).

Type locality: Opara Island, Polynesia (Pfeiffer 1846), but Pilsbry (1906) supposes that there was some mistake in the attribution of this locality and states that Pfeiffer's specimens are very similar to the ones found in Central America.

Remarks: This species occurs from Mexico to the southeastern Brazilian states of Rio de Janeiro and São Paulo, also including the Caribbean Islands (Simone 2006). Nevertheless, to our knowledge this is the first record specific to Bahia.

Family Streptaxidae
Genus *Rectartemon* Baker, 1925

Rectartemon cf. *piquetensis* (Pilsbry, 1930)
(Figs. 10–12)

Artemon piquetensis Pilsbry, 1930: 365 (pl. 32, figs. 5a–b).
Artemon intermedius piquetensis: Morretes 1949: 166.
Streptaxis piquetensis: Salgado & Coelho 2003: 171.
Rectartemon piquetensis: Simone 2006: 199 (fig. 746).

Material analyzed: MZSP 107965 (1 shell).
Dimensions (in mm): H = 13.1, D = 21.3.
Type locality: Piquete, São Paulo, Brazil.

Remarks: This species is known only from its type locality and from the northeast of Minas Gerais state (personal observation); it also has a record from Bahia state that likely is a misidentification (Simone 2006). The present record calls attention to the possible species occurrence in Bahia, from a locality very close to its occurrence in Minas Gerais. However, the present specimen has a more depressed spire and a taller body whorl, with a rounded profile. The types of *R. piquetensis* (Simone 2006: fig. 746) have a higher spire and a shorter body whorl with a peripheral carina in its median portion. Due to the low number of specimens in museum collections, it is currently not possible to assess whether these differences are indicative of specific differentiation or simple morphological variation.

Family Pleurodontidae
Genus *Solaropsis* Beck, 1837

Solaropsis alcobacensis **n. sp.**
(Figs. 13–15)

Holotype: MZSP 107964.
Type locality: Brazil, Bahia, Alcobaça, 17°30′10″S 39°11′42″W, ~10 m of elevation (Coltro col., viii/2012).

Etymology: The specific epithet refers to the type locality.

Diagnosis: Flattened spire; proportionately large and oval aperture, with slight angle at the basal region. Proportionately narrow and deep umbilicus. Color white, with a single strong brown spiral band immediately below carina and a series of numerous parallel thin light brown dotted spiral bands beginning below the strong band and reaching umbilicus.

Description: Shell large, discoid, with flattened spire; shell length ~½ its width. Color white, with single strong light brown spiral band immediately below carina and series of numerous parallel thin light brown dotted spiral bands; 9–10 equidistant bands between carina and umbilicus; space between bands ~3 times their width (Fig. 14). Spire angle ~135°. Protoconch of 1¾ whorl, blunt, smooth; transition to teleoconch clear. Teleoconch sculptured by fine, raised, well-marked and regularly distributed sinuous ribs, increasing below carina. Whorls profile weakly convex; strong peripheral carina, profile angle ~105°, located in superior third of body whorl. Suture shallow but well-marked. Body whorl ~⅞ shell height. Aperture large, oval, with slight angle at the basal region; slightly prosocline (~20° in relation to shell axis); ~¾ shell height, ~½ shell width. Peristome reflected, especially on basal and columellar regions. Umbilicus wide, deep, occupying ~10 % of inferior surface.

Holotype dimensions (in mm): 4.5 whorls; H = 16.3; D = 33.2; h = 12.0; d = 17.3.

Distribution: Known only from type locality.

Remarks: The genus *Solaropsis* occurs from Costa Rica to northern Argentina, being especially diverse in Guyana and Brazil (Cuezzo 2003, Simone 2006). Despite the single shell found being slightly worn out, we believe it bears enough diagnostic characters to be considered a distinct species.

Differential diagnosis: *Solaropsis alcobacensis* n. sp. belongs to the group within the genus that possesses a pronounced peripheral keel or carina. As such, comparisons are here restricted to this group: *Solaropsis alcobacensis* bears some resemblance to *S. amazonicus* (Pfeiffer, 1854) from the north of Brazil, *S. planior* (Pilsbry, 1899) from the states of Espírito Santo and São Paulo, and *S. punctatus* (Wagner, 1827) from the states of Piauí, Pernambuco and Bahia (Simone 2006). – *Solaropsis alcobacensis* can be distinguished from *S. amazonicus* by its white color, smaller size, more flattened spire, a proportionately larger and more oval aperture, a narrower umbilicus and the regularity of the parallel brown bands. Moreover, the peristome of *S. amazonicus* partially covers the umbilicus and its holotype (Simone 2006: fig. 918) has a more median peripheral carina (profile angle ~90°). *Solaropsis alcobacensis* differs from *S. planior* by its taller and less laterally elongated aperture, a narrower and more cylindrical umbilicus, a more flattened shell (lower height/width) and a greater number of spiral brown bands. The holotype of *S. planior* (Simone 2006: fig. 931) also has a higher carina (profile angle ~115°). Finally, *S.*

alcobacensis can be distinguished from *S. punctatus* by its much smaller size (~33 mm, against ~50 mm in *S. punctatus*), a proportionately larger and more oval aperture (with a slight angle at the basal region), a narrower and more cylindrical umbilicus, and a greater number of spiral brown bands. Moreover, *S. alcobacensis* also lacks the sinuous axial brown bands found in *S. punctatus*.

4 Discussion

The geographical ranges of *Beckianum beckianum* and, possibly, also of *Rectartemon piquetensis* are here extended to Bahia. *Helicina angulifera*, *Gastrocopta oblonga*, *Bulimulus tenuissimus*, *Leiostracus vimineus* and *Burringtonia pantagruelina*, though already known to Bahia, are recorded here for the region of Alcobaça. Finally, by the new species presented here, *Solaropsis alcobacensis*, this paper is also a reminder that the remnants of Atlantic rainforest might act as refuge for many species (sometimes endemic) and therefore require protection and appropriate legislation. This in turn leaves us with the question of how many species are being extinct before even being known to us. The knowledge of the local fauna of each place is the first step towards environmental protection, and it is our hope that this paper is a step towards this goal.

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Trachelipus species (Isopoda: Oniscidea) of the eastern Black Sea coast

Helmut Schmalfuss & Dilyara Khisametdinova

Abstract

The *Trachelipus* species known up to now from the eastern Black Sea coast (Russia, Georgia, Turkey) are re-described after type material, their diagnostic characters are illustrated, and newly collected material of these species is reported.

Keywords: Isopoda, Oniscidea, *Trachelipus*, re-descriptions, eastern Black Sea coast, new records.

Zusammenfassung

Die *Trachelipus*-Arten, die bis jetzt von der Küstenregion des östlichen Schwarzen Meeres bekannt sind, werden mit Abbildungen ihrer diagnostischen Merkmale nachbeschrieben und neue Fundorte dieser Arten werden gemeldet.

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1 Introduction

The terrestrial isopod genus *Trachelipus* is distributed in the temperate forest zone of Europe and western Asia, with the easternmost records from the Elburs Mountains in Iran. Up to now 57 species have been described (Schmalfuss 2003, Schmalfuss et al. 2004, Borutzky 1976). In the Caucasus region the genus is widespread, but only a few species have been described during the last century in a rather insufficient way. This makes it very difficult, if not impossible, to safely identify *Trachelipus* material from that region, which induced us to re-investigate the type material of the described species and to publish comparable illustrations of the diagnostic characters, together with unpublished samples of the species concerned.

Abbreviations

BML	British Museum of Natural History, London, United Kingdom
SMNS	Staatliches Museum für Naturkunde Stuttgart (+ number of isopod collection), Germany
ZSM	Zoologische Staatssammlung München, Germany

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Drs. Sh. Barjadze (Kutaisi/Georgia), S. Huber (Oberuhldingen/Germany), R. Kinzelbach (Greifswald/Germany), E. Kohler (Schwäbisch Hall/Germany), J. Kontschán (Budapest/Hungary), T. Osten † (SMNS), H. Pieper (Schwentinental/Germany), J. Popov (Moscow/Russia) and W. Rähle (Tübingen/Germany) have donated isopod material used in the article; S. Friedrich (ZSM) has loaned type material of the treated species; Drs. S. Sfenthourakis (Nicosia/Cyprus) and S. Taiti (Florence/Italy) helped to improve the original manuscript. Dr. K. Wolf-Schwenninger (SMNS) operated the scanning electron microscope. To all of them we wish to express our sincere thanks.

The second author was financially supported by grants from the Ministry of Education and Science (Russian Federation) and the Deutsche Akademische Austauschdienst (Germany).

2 The genus *Trachelipus* Budde-Lund, 1908

Diagnostic characters of the genus *Trachelipus*:

1. Tergal parts always more or less tuberculated or granulated.
2. Head always with well-developed lateral and medial frontal lobes, angle between lateral and medial lobe can be less or more than 90°.
3. Hind margin of pereon-epimera 1 concave.
4. Pleon with well-developed epimera, so body-outline continuous.
5. All pleopod-exopodites equipped with open respiratory fields.
6. Well-developed roundish gland-pore fields on pereon-epimera, whose distance from lateral margin varies among species.
7. Noduli laterales on pereon segment 1 in a considerably more medial position than on segments 2–7.

8. Carpus of male pereopod 7 with more or less pronounced ridge.

9. Male pleopod-exopodite 1 with median pointed hind-lobe.

The genus *Trachelipus* shows, except for the different structure of the pleopod-exopodites, great similarity to the genus *Porcellio*, which should, however, be due to convergence, since the respiratory structures plead for different phyletic lines.

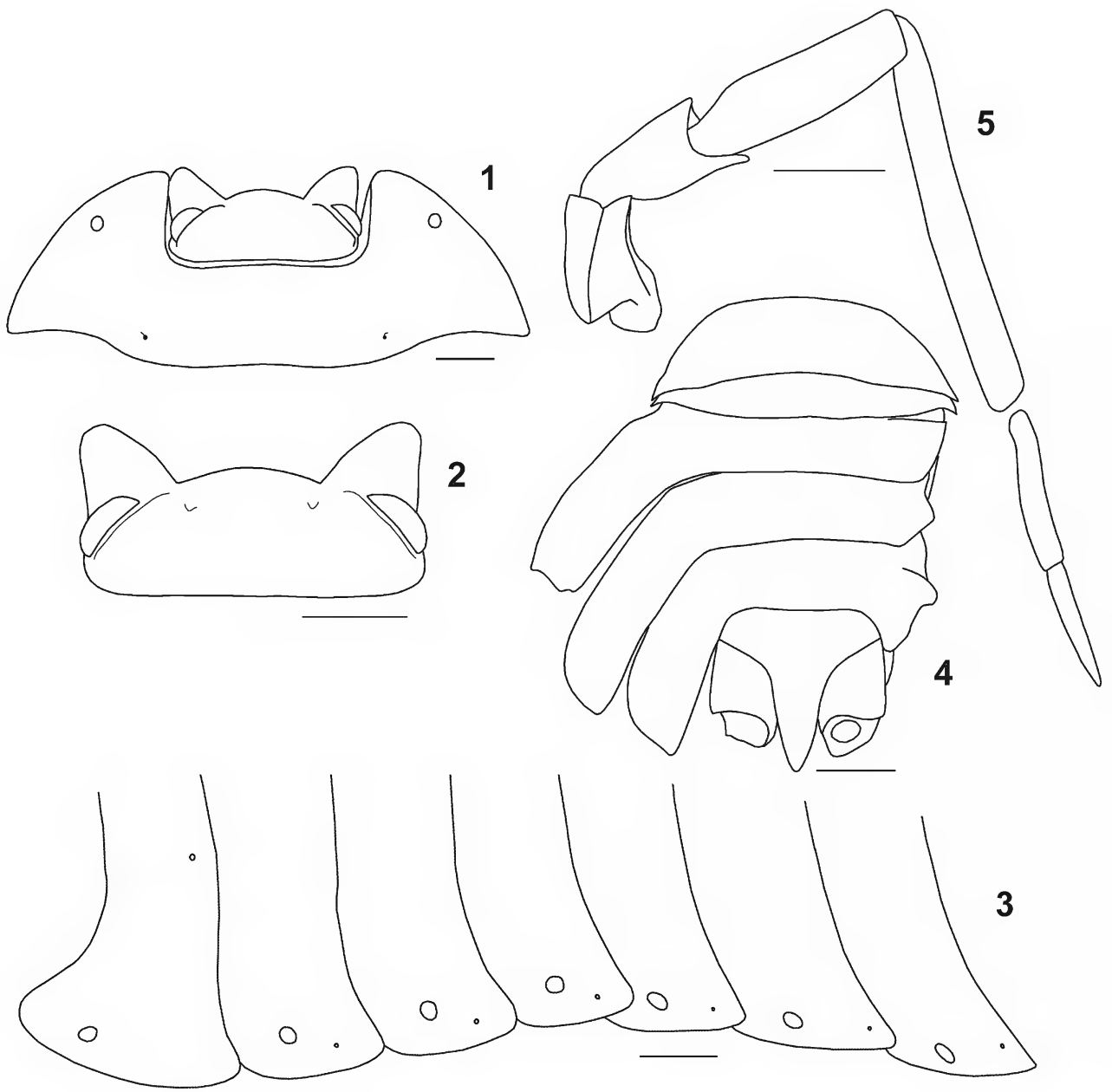
3 The species of *Trachelipus* of the eastern Black Sea coast

Trachelipus caucasius (Verhoeff, 1918)
(Figs. 1–8 and map Fig. 9)

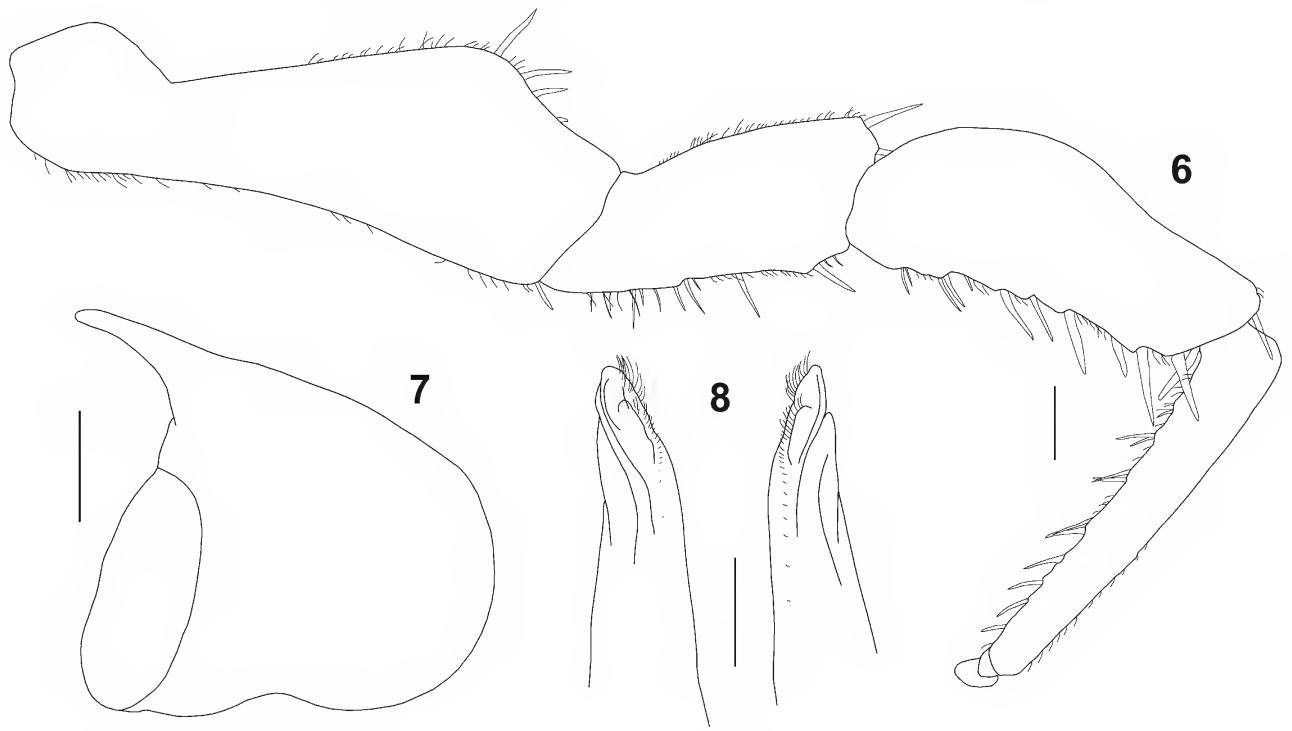
Synonym: *Tracheoniscus caucasius.*

Bibliography

Verhoeff 1918: 112; Verhoeff 1933: 107.



Figs. 1–5. *Trachelipus caucasius*, lectotype, ♂, 18.1 × 11.0 mm (Georgia, ZSM). – **1**. Head and pereon-tergite 1, dorsal view. **2**. Head, dorsal view. **3**. Pereon-epimera 1–7 with gland-fields and noduli laterales, dorso-lateral view. **4**. Pleon, dorsal view. **5**. Antenna. – Scales: 1 mm.



Figs. 6–8. *Trachelipus caucasius*, lectotype, ♂, 18.1 × 11.0 mm (Georgia, ZSM). – **6**. Pereopod 7, frontal view. **7**. Pleopod-exopodite 1, dorsal view. **8**. Apices of pleopod-endopodites 1. – Scales: 0.2 mm (6), 0.3 mm (7–8).

Type material re-examined

Lectotype, herewith designated to fix identity of species: ♂ (18.0 × 11.0 mm, formerly dried and pinned, with slide preparation of pereopod 7 and pleopod 1), western Caucasus, Georgia, Abkhazia, Black Sea coast, near Gagra (= Gagri, between Sochi and Sokhumi), leg. Lignau, date ? (ZSM, Reg. Nr. A 20111536).

Paralectotype: 1 ♀ (10.6 × 6.3 mm), same collecting data as lectotype (ZSM, Reg. Nr. A 20111537).

New material

Russia: 2 ♀♀, 5 immat., Black Sea coast, Dagomys NW of Sochi, leg. J. Popov, 10.–14.VII.1987 (SMNS 13013).

Georgia: 1 ♀, W, Guria Mts., 20 km S of Santredia, leg. Rähle, 4.IX.2000 (SMNS 13065). – 2 ♀♀, 1 juv., NW, Inguri valley, 15 km N of Jvari, wet forest, leg. Rähle, 30.VIII.2000 (SMNS 13066). – 2 ♀♀, Imereti region, Chiatura district E of Kutaisi, village Darkveti, cave Samerskhleklde, leg. Barjadze, 20.VIII.2011 (SMNS 13105).

Turkey: 1 ♂, 1 ♀ (20 mm long), NE, province Erzurum, Çoruh Nehri valley, Çamlıkaya, 1000 m, leg. Kinzelbach, 28.VII.1988 (SMNS 11387). – 3 ♂♂, 3 ♀♀, NE, province Erzurum, Çoruh Nehri valley, near Artvin, Taşlica, 1000 m, leg. Pieper, 30.IX.1996 (SMNS 11442). – 2 ♂♂, 1 ♀, 1 juv., NE, province Erzurum, 30 km E of Artvin, E of Ardanuç, 1400 m, *Picea* forest, leg. Schmalfuss, 27.VII.2001 (SMNS 11514). – 10 ex., NE, province Erzurum, Black Sea coast, Hopa, leg. Osten, 25.VI.1987 (SMNS 11233). – 3 ♂♂, 3 ♀♀, NE, province Erzurum, 60 km NE of Artvin, below pass of Savşat, 2200 m, leg. Pieper, 28.IX.1996 (SMNS 11443). – 1 ♀, 1 juv., NE, province Erzurum, 70 km SW of Artvin, 10 km N of Yusufeli, river bank, leg. Schmalfuss, 22.VII.2001 (SMNS 11503).

Diagnostic characters

Maximum dimensions: 20.0 × 11.5 mm.

Coloration: Tergal parts blackish brown, posterior parts of epimera yellowish, juveniles and sometimes females with mottled tergites.

Cuticular structures: Tergites granulated; glandular fields on pereon-epimera 2–7 more than their diameter away from lateral margin (Fig. 3).

Frontal part of head with triangular lateral lobes, central lobe flat and rounded, much shorter than lateral lobes, with angles of more than 90° between lateral and central lobes (Figs. 1, 2); epimera of pereon-segment 1 with deep rounded posterior concavity (Figs. 1, 3). Telson with deep lateral angles and pointed apex (Fig. 4). Antenna see Fig. 5, proximal segment of flagellum slightly longer than distal one. Carpus of male pereopod 7 proximally with rounded enlargement (Fig. 6). Exopodite of male pleopod 1 with narrow and comparatively short hind lobe, medial margin straight (Fig. 7), endopodites of male pleopod 1 see Fig. 8.

Distribution

From the region of Sochi (Russia, Black Sea coast) through western Georgia to the northeastern part of Turkey (see map Fig. 9).

Fig. 9. Records of *Trachelipus caucasius*.

Trachelipus gagriensis (Verhoeff, 1918) = nomen dubium

Synonym: *Tracheoniscus gagriensis*.

Bibliography

Verhoeff 1918: 110, figs. 1–2; Verhoeff 1933: 107.

Type material re-examined

Holotype: 1 ♂ (length, according to Verhoeff 1918, 8.75 mm, width 3.8 mm, with slide preparation of pereopod 7 and pleopod 1), western Caucasus, Georgia, Abkhazia, Black Sea coast, near Gagra (= Gagri, between Sochi and Sokhumi), leg. Lignau, date ? (ZSM, Reg. Nr. A 20111538).

Remarks

The single type specimen is a juvenile male whose diagnostic characters do not yet exhibit those of the adult males of *Trachelipus* (pereopod 7, pleopod-exopodite 1). Therefore it is impossible to identify the species with safety and we consider *T. gagriensis* a nomen dubium.

Trachelipus razzautii (Arcangeli, 1913)
(Figs. 10–14 and map Fig. 15)

Synonyms: *Porcellio razzautii*, *Tracheoniscus brentanus*, *T. kigatensis*, *T. larii*, *T. simrothi*.

Bibliography

A complete reference list of the species is found in Schmalfuss (2003). The following publications treat the records around the Black Sea, described as *T. kigatensis*: Verhoeff 1943: 17, 20, figs. 23, 27 (European shore of Bosporus); Verhoeff 1949: 29; Schmidt 1997: 204.

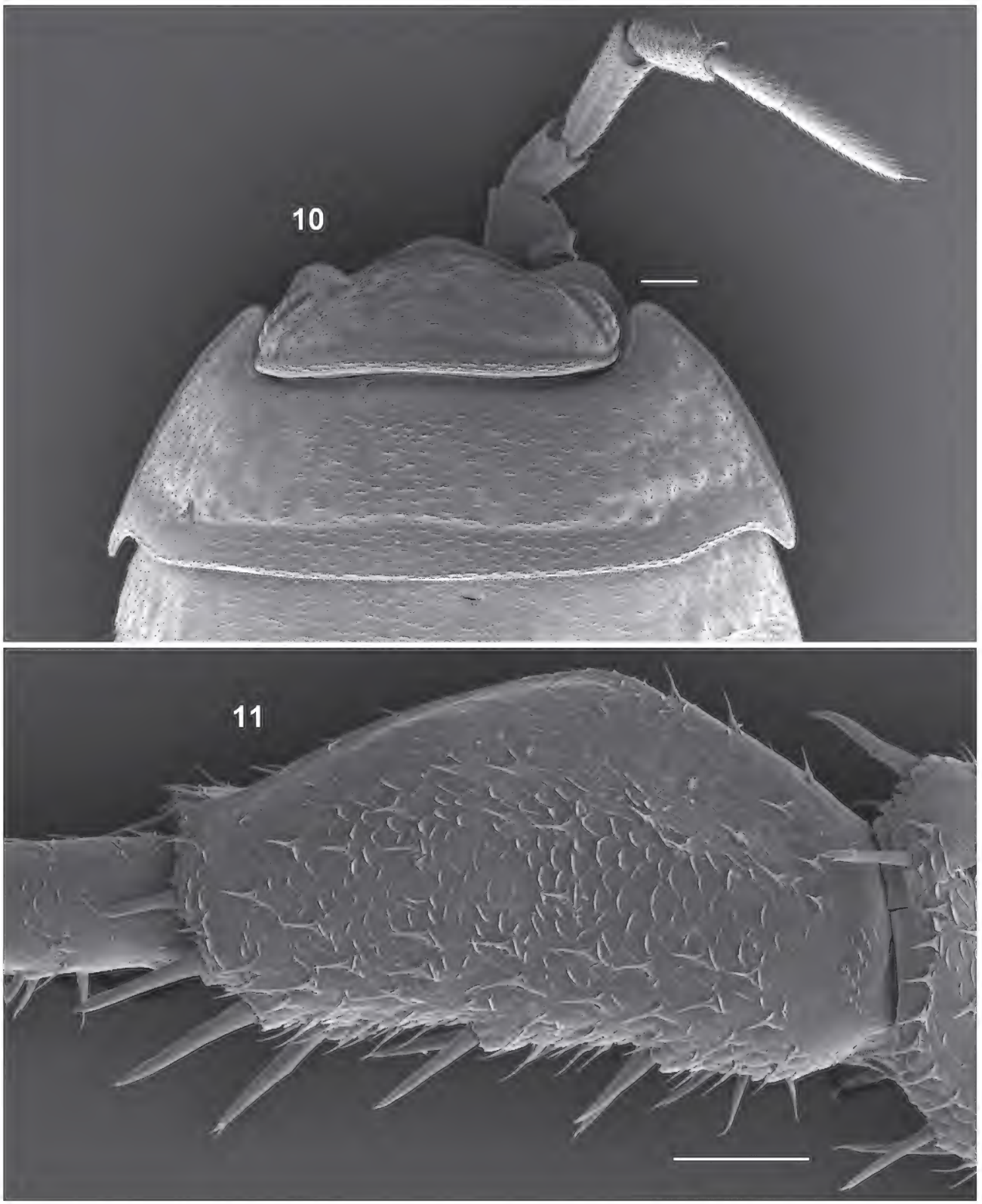
New material

Russia: 12 ex., SW-Russia, Rostov region, near village Konigin, Medvejia ravine, leg. D. Khisametdinova & A. Evsukov, 16.VI.2009 (SMNS 13127). – 34 ex., northwestern Caucasus, Republic of Adygea, Lago-Naki Plateau, alpine meadow, 1800 m, leg. D. Khisametdinova & A. Evsukov, 24.VI.2010 (SMNS 13110). – 1 ♀, northwestern Caucasus, Republic of Adygea, near village Dakhovskay, Skalisty Ridge, eastern slope, 800 m, leg. D. Khisametdinova & A. Evsukov, 30.VI.2010 (SMNS 13120). – 9 ex., SW-Russia, Krasnodarsky Kray, Apsheronsky District, near Stanitsa Temnolesskaya, *Carpinus* forest, leg. D. Khisametdinova & Y. Kochetov, 16.VIII.2011 (SMNS 13123).

Turkey: 2 ♀♀, southwestern Black Sea coast, 20 km NE of Zonguldak, Hisarönu, leg. E. Kohler, VIII.1973 (SMNS 11005). – 2 ♂♂, NE-Anatolia, 40 km S of Trabzon, Province Gümüşhane, 15 km NE of Manastir, Cehennem Valley, leg. E. Kachikov, 15.V.2011 (SMNS 11594).

Bulgaria: 1 ♀, SW-Bulgaria, 30 km N of Blagoevgrad, Rila Monastery, 800 m, forest, leg. S. Huber, 6.VIII.2005 (SMNS 5559).

Greece: 1 ♂, eastern Macedonia, prefecture Sérres, N of Sérres, 900 m, 41°14′N/23°40′E, leg. J. Kontschán, 30.III.2007 (SMNS 1138). – 16 ex., NE-Aegean island Lésvos (Lesbos), Skála Sikamiás, beach, leg. F. Erhard & H. Schmalfuss, 18.V.1995 (SMNS 2508). – 3 ♀♀, NE-Aegean island Lésvos (Lesbos), 12 km W of Mitilíni, leg. F. Erhard & H. Schmalfuss, 17.–21.V.1995 (SMNS 2506). – 17 ♀♀, NE-Aegean island Lésvos (Lesbos), 5 km N of Eresós, leg. F. Erhard & H. Schmalfuss, 9.V.1995 (SMNS 2492).



Figs. 10–11. *Trachelipus razzautii*, ♂, 5.6 × 3.2 mm (Russia, Rostov region, SMNS 13127, SEM-photographs). – **10**. Head and pereontergite 1, dorsal view. **11**. Carpus 7, caudal view. – Scales: 0.2 mm (10), 0.1 mm (11).

Diagnostic characters

Maximum dimensions: ♂ 7.2 × 3.5 mm, ♀ 9.2 × 4.2 mm.

Coloration: Light brown with pronounced yellowish muscle spots, two rows of light streaks on bases of pereon-epimera and one median row, posterior corners of pereon-epimera and uropods yellowish.

Cuticular structures: Tergites slightly granulated (Fig. 10); glandular fields on pereon-epimera situated at lateral margin.

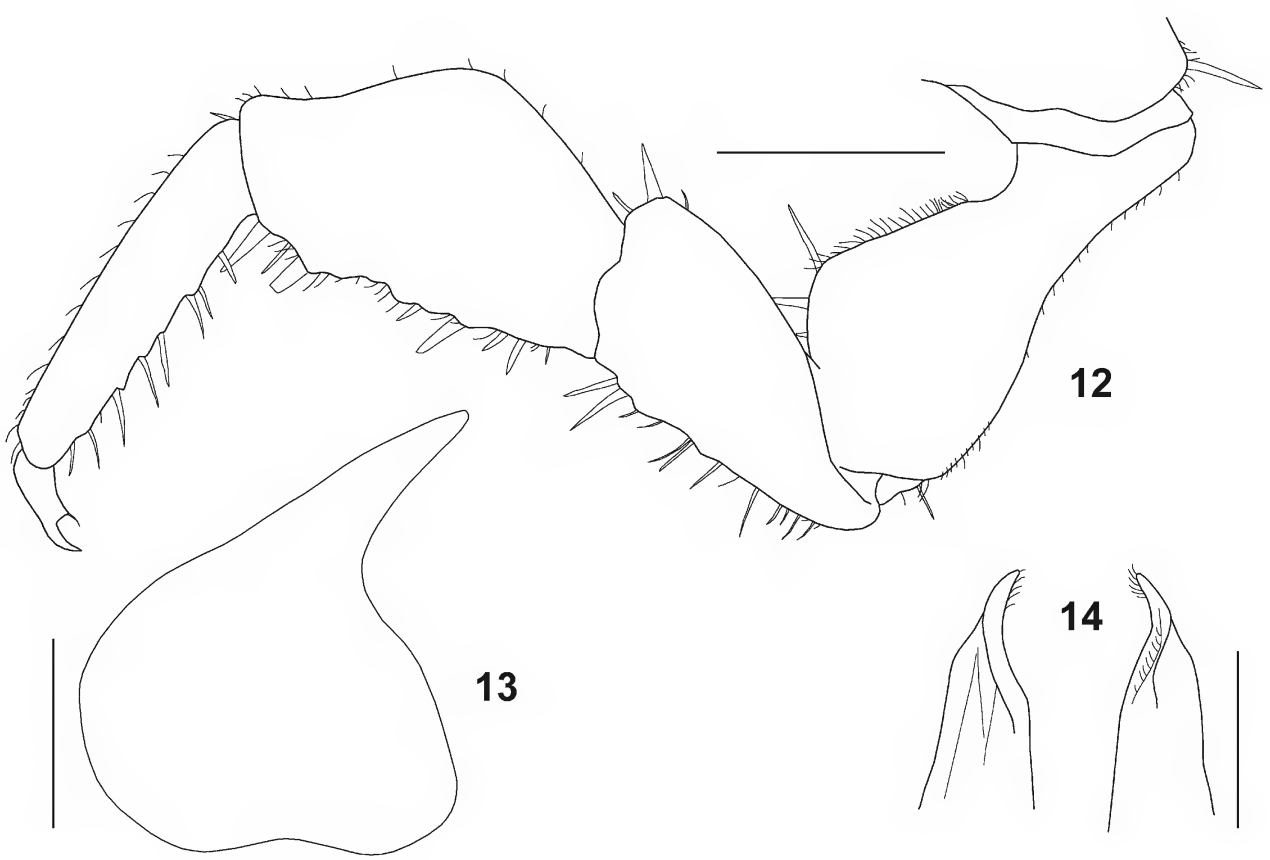
Frontal part of head with trapezoidal lateral lobes, central lobe rounded, longer than lateral lobes, with angles of more than 90° between lateral and central lobes; epimera of pereon-segment 1 with rounded posterior concavity (Fig. 10). Telson laterally with rounded concavities and pointed apex. Antenna with distal segment of flagellum nearly twice as long as proximal one (Fig. 10). Carpus of male pereopod 7 with well-developed rounded ridge (Figs. 11–12). Exopodite of male pleopod 1 with long narrow hind lobe, medial margin straight (Fig. 13), endopodites of male pleopod 1 see Fig. 14.

Distribution

Northern Italy; Slovenia; SW-Bulgaria; Greece: northeastern mainland and Aegean island Mitilíni (= Lésvos); Turkey along Black Sea coast; southwestern Russia around eastern Black Sea (for records around Black Sea see map Fig. 15).

Remarks

The treated material is identified as *Trachelipus razzautii*. Schmidt (1997: 204) synonymized *Tracheoniscus larii* Verhoeff, 1927, *T. brentanus* Verhoeff, 1927, *T. simrothi* Verhoeff, 1936 (all from Italy) and *T. kigatensis* Verhoeff, 1943 (from the Black Sea) with *T. razzautii*. We found slight differences between the specimens from northern Italy and those from around the Black Sea, e. g. the median frontal lobe is shorter and more rounded in the Italian specimens (compare Fig. 10 with fig. 69 in Schmidt 1997: 211). Considering a certain intraspecific variability and the fact that the sexual male characters are identical in samples from Italy and the Black Sea region we treat these populations as conspecific.



Figs. 12–14. *Trachelipus razzautii*, ♂, 7.2 × 3.5 mm (Russia, Rostov region, SMNS 13127). – **12**. Pereopod 7, frontal view. **13**. Pleopod-exopodite 1, ventral view. **14**. Apices of pleopod-endopodites 1. – Scales: 0.4 mm (12–13), 0.3 mm (14).

Fig. 15. Records of *Trachelipus razzautii* around the Black Sea. Further to the west the species is known from the northern Greek mainland (material examined), southwestern Bulgaria (material examined), Slovenia and northern Italy (see bibliography).

Borutzky (1976) has described *Trachelipus sarmaticus* from Saporoshje in the Ukraine. The author remarked that the new species is close to *T. razzautii* and *T. kigatensis*. During a visit to the Moscow State University Museum the junior author of the present article tried to investigate the types of *T. sarmaticus*, but the type specimens could not be found. At present we suspect that *T. sarmaticus* is conspecific with *T. razzautii*, but this question can only be answered if specimens from the type locality are available for investigation.

Trachelipus lignaui (Verhoeff, 1918)
(Figs. 16–21 and map Fig. 22)

Synonym: *Tracheoniscus lignaui*.

Bibliography

Verhoeff 1918: 111, figs. 3–4; Verhoeff 1933: 106; Schmidt 1997: 243.

Type material re-examined

Lectotype, herewith designated to fix identity of species: 1 ♂ (length, according to Verhoeff 1918, 7.5 mm, width 3.6 mm, with slide preparation of pereopod 7 and pleopod 1); western Caucasus, Georgia, Abkhazia, Black Sea coast, near Gagra (= Gagri, between Sochi and Sokhumi), leg. Lignau, date ? (ZSM, Reg. Nr. A 20111540).

New material

Russia: 1 ♂, Black Sea coast, near Sochi, Dagomys, leg. J. Popov, 10.VII.–14.VII.1987 (SMNS 13104). – 4 ♂♂, 1 ♀, northwestern Caucasus, Republic of Adygea, 60 km S of Maikop, near settlement Nikel, bank of Zolotoy river, *Fagus* and *Carpinus* forest, 700 m, leg. D. Khisametdinova, A. Evsukov, 13.–19.VI.2010 (SMNS 13117). – 1 ♂, ?subadult, Black Sea coast, Krasnodarsky kray, near village Novomichailovskyi, leg. D. Khisametdinova, 16.VIII.2004 (SMNS 13129). – 1 ♂, 1 ♀, Rostov-on-Don, greenhouse of State University, leg. D. Khisametdinova, 30.VIII.2007 (SMNS 13121).

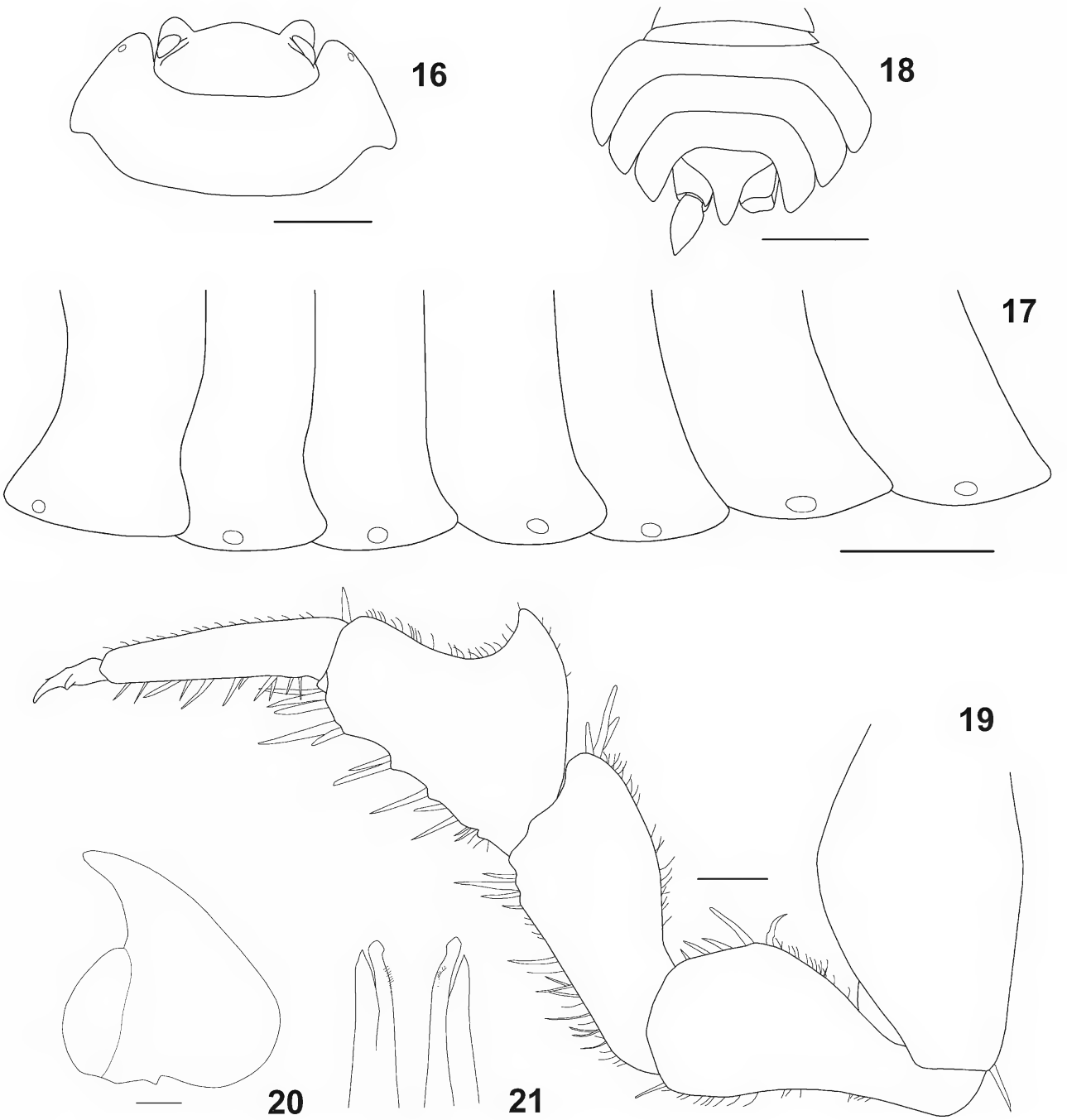
Diagnostic characters

Maximum dimensions: 8.5 × 3.7 mm.

Coloration: Light brown with usual light muscle spots, two rows of light streaks on bases of pereon-epimera, posterior parts of pereon-epimera, antennae and uropods yellowish.

Cuticular structures: Tergites only very slightly granulated; glandular fields on pereon-epimera situated at lateral margin (Fig. 17).

Frontal part of head with semicircular lateral lobes, central lobe flat and rounded, slightly longer than or at the same level with lateral lobes, with angles of more than 90° between lateral and central lobes; epimera of pereon-segment 1 with rounded posterior concavity (Fig. 16). Telson laterally with rounded concavities and pointed apex



Figs. 16–21. *Trachelipus lignaui*, lectotype, ♂, 7.5 × 3.6 mm (Georgia, ZSM). – **16**. Head and pereon-tergite 1, dorsal view. **17**. Pereon-epimera 1–7 with gland-fields, dorso-lateral view. **18**. Pleon, dorsal view. **19**. Pereopod 7, frontal view. **20**. Pleopod-exopodite 1, dorsal view. **21**. Apices of pleopod-endopodites 1. – Scales: 1 mm (16–18), 2 mm (19–21).

(Fig. 18). Antenna with distal segment of flagellum about 2.5 times as long as proximal one. Carpus of male pereopod 7 distally with big and sharply pointed enlargement (Fig. 19). Exopodite of male pleopod 1 with broad but long hind lobe, medial margin convex (Fig. 20), endopodites of male pleopod 1 see Fig. 21.

Fig. 22. Records of *Trachelipus lignaui*.

Distribution

Russia, Black Sea coast from Gagra in the south (between Sochi and Sokhumi) to Novomichailovskyi in the north, and inland in the Republic of Adygea south of Maikop (see map Fig. 22). The record from a greenhouse in Rostov-on-Don may be due to anthropogenic introduction.

Trachelipus longipennis (Budde-Lund, 1885) = nomen dubium

Synonym: *Porcellio longipennis*.

Bibliography

Budde-Lund 1885: 91; Schmidt 1997: 244; Jeppesen 2000: 246.

Remarks

Budde-Lund (1885: 91) reports this species from the northwestern part of Georgia (Abkhazia) and from the Crimea. Schmidt (1997: 244) has investigated type material (parts of two females) housed in the BML, suggesting the possibility that this material is conspecific with *T. lutshnikii*. As no illustrations exist and as no safe conclusions on the identity of the species can be drawn from females we consider this taxon for the time being as a nomen dubium.

Trachelipus lutshnikii (Verhoeff, 1933) (Figs. 23–29 and map Fig. 30)

Synonym: *Tracheoniscus lutshnikii*.

Bibliography

Verhoeff 1933: 107, figs. 16–17; Schmidt 1997: 244.

Type material re-examined

Lectotype, herewith designated to fix identity of species: slide preparation of male pereopods 7 and male pleopods 1 and 2, southern Russia, coast of Black Sea, near Sochi, VII.1931, leg. V. Lutshnik, date? (ZSM).

Paralectotype: ♀ with marsupium, formerly dried and pinned, 12.0 × 6.6 mm, collecting data as lectotype (ZSM, Reg. Nr. A 20111541).

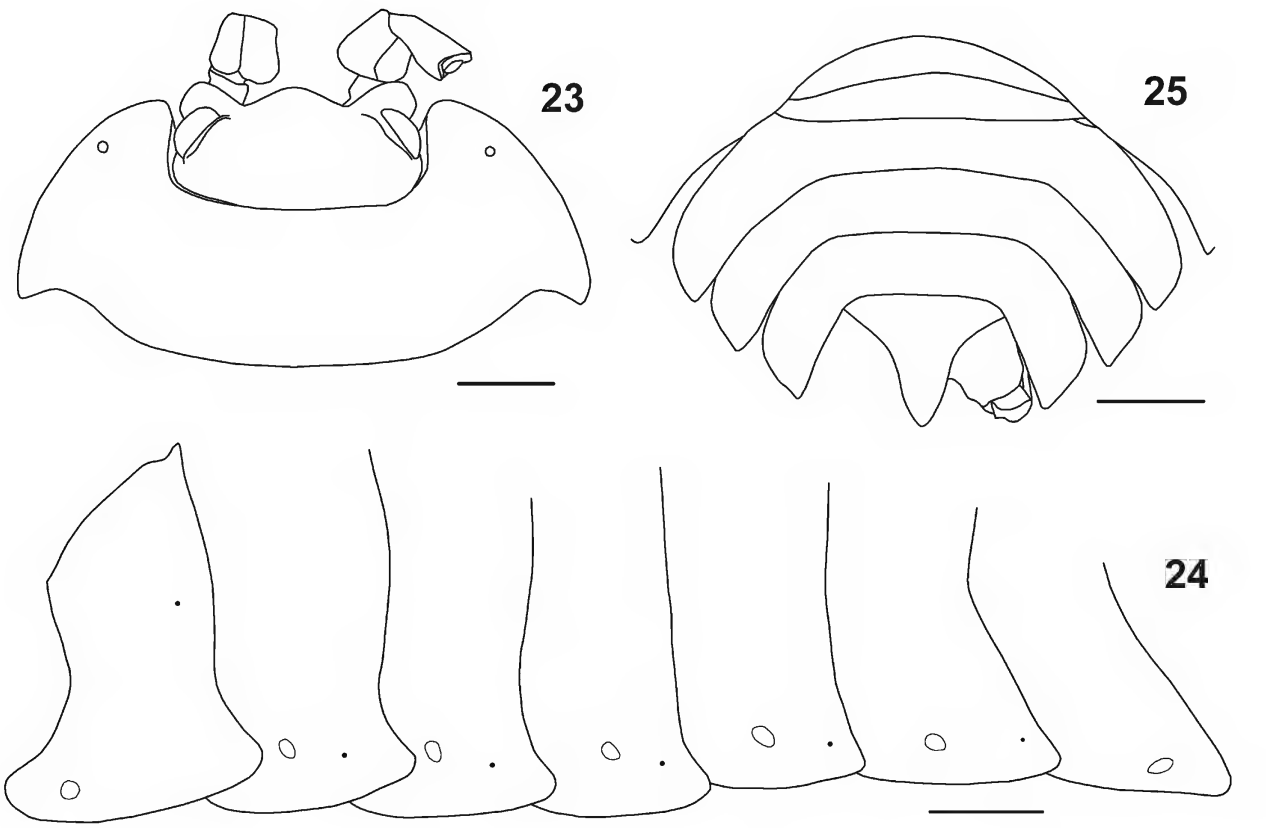
New material

Russia: 5 ♂♂, coast of Black Sea, Krasnodarsky kray, near village Novomichailovskyi, along stream, under rotten trees, leg. D. Khisametdinova, 16.VIII.2004 (SMNS 13063).

Diagnostic characters

Maximum dimensions: 14 mm long (Verhoeff 1933), the biggest specimen of the recently collected material is 12.0 × 6.0 mm.

Coloration: In the fresh specimens the upper parts are dark brown with usual light muscle spots, posterior parts of epimera yellowish.



Figs. 23–25. *Trachelipus lutshnikii*, paralectotype, ♀, 11.5 × 6.8 mm (Russia, Sochi, ZSM). – **23**. Head and pereon-tergite 1, dorsal view. **24**. Pereon-epimera 1–7 with gland-fields and noduli laterales, dorso-lateral view. **25**. Pleon, dorsal view. – Scales: 1 mm.

Cuticular structures: Tergites granulated; glandular fields on pereon-epimera 2–7 more than their diameter away from lateral margin (Fig. 24).

Frontal part of head with trapezoidal lateral lobes, central lobe rounded, slightly shorter than lateral lobes, with angles of more than 90° between lateral and central lobes; epimera of pereon-segment 1 with rounded posterior concavity (Figs. 23, 24). Telson laterally with rounded concavities and pointed apex (Fig. 25). Antenna with distal segment of flagellum about 2.5 times as long as proximal one. Carpus of male pereopod 7 proximally with moderate ridge (Fig. 26), ischium 7 ventrally straight (Fig. 27). Exopodite of male pleopod 1 with short, narrow pointed hind lobe, medial margin convex (Fig. 28), endopodites of male pleopod 1 see Fig. 29.

Distribution

Southwestern Russia, northeastern coast of Black Sea (map Fig. 30).

4 References

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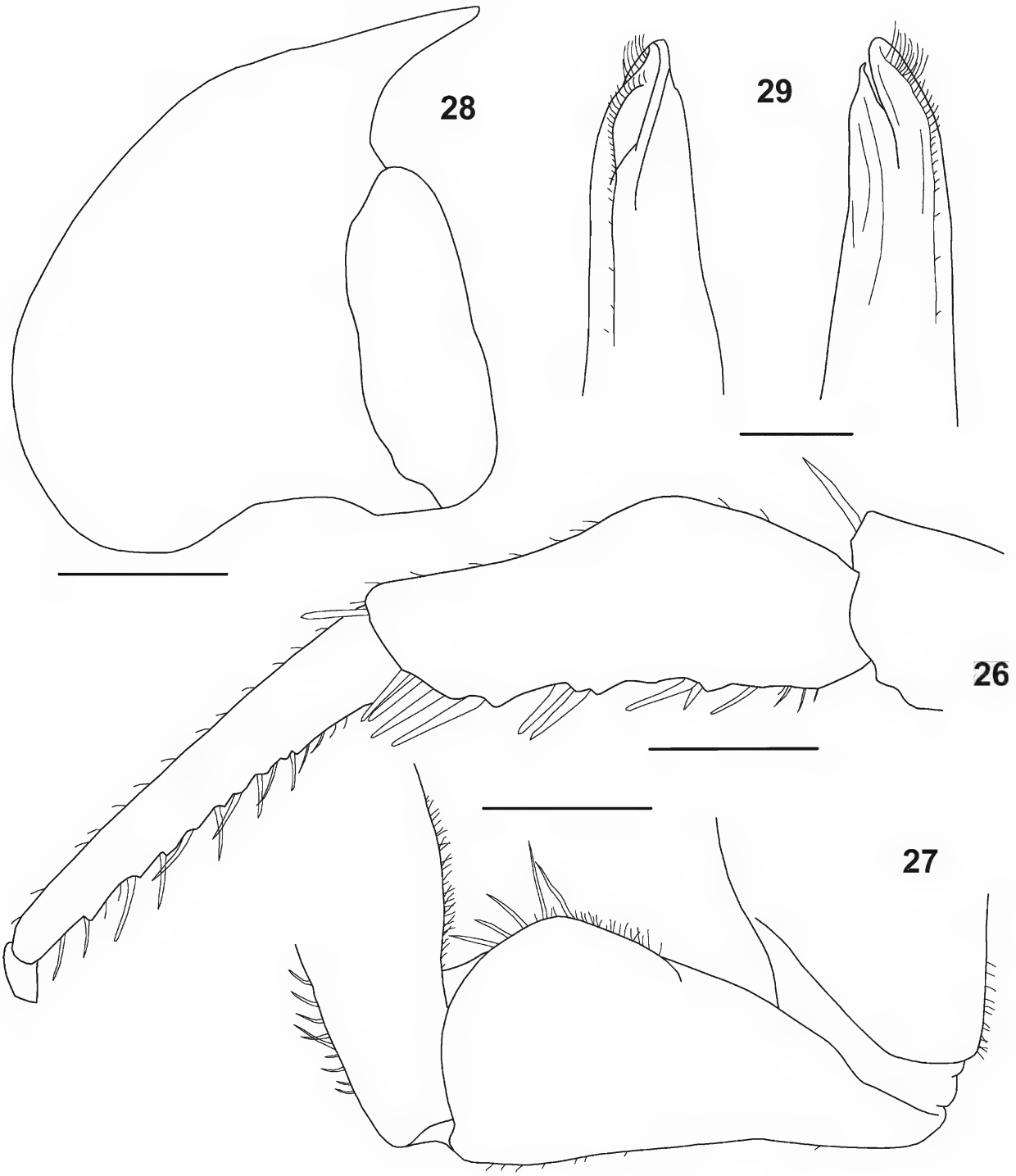

Figs. 26–29. *Trachelipus lutshnikii*, lectotype, ♂, slide preparation (Russia, Sochi, ZSM). – **26**. Carpus 7, frontal view. – **27.** Ischium 7. – **28**. Pleopod-exopodite 1, dorsal view. **29**. Apices of pleopod-endopodites 1. – Scales: 0.3 mm (26–28), 0.2 mm (29).

Fig. 30. Records of *Trachelipus lutshnikii*.

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The terrestrial isopods (Isopoda: Oniscidea) of Greece. 29th contribution: The genus *Armadillidium* (Armadillidiidae), supplement[1]

Helmut Schmalfuss

Abstract

Armadillidium anconanum, up to now only known from Italy, is recorded for the first time from Greece (possibly introduced). The diagnostic characters are illustrated by SEM-photographs. This adds up to 60 species of *Armadillidium* known from Greece. Additionally, the difficult taxonomical situation of *Armadillidium fossuligerum* is discussed.

Key words: Isopoda, Oniscidea, *Armadillidium*, Greece, new species record.

Zusammenfassung

Armadillidium anconanum, bisher nur aus Italien bekannt, wird zum ersten Mal aus Griechenland gemeldet (möglicherweise eingeschleppt). Die diagnostischen Merkmale werden durch REM-Fotografien illustriert. Damit sind nunmehr 60 *Armadillidium*-Arten aus Griechenland nachgewiesen. Des Weiteren wird die schwierige taxonomische Situation von *Armadillidium fossuligerum* diskutiert.

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2 A first Greek record of *Armadillidium anconanum* Verhoeff, 1928 21
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1 Introduction

Between 2006 and 2012 the author published a series of six papers on the genus *Armadillidium* known from Greece (Schmalfuss 2006a, b, 2008, 2010, 2011, 2012). They contain descriptions, illustrations of all diagnostic characters and distribution maps of 59 Greek species presently considered as valid. A summarizing list of these species is given in Schmalfuss (2013). The present article is a supplement to this revision of the Greek *Armadillidium* species, in which a first Greek record of a probably introduced Italian species is presented. So now 60 species of *Armadillidium* are known from Greece. In addition the complicated case of *Armadillidium fossuligerum* is discussed.

Abbreviation

SMNS Staatliches Museum für Naturkunde Stuttgart (+ number of isopod collection), Germany

Acknowledgments

S. Huber (Oberuhldingen/Germany) has donated the isopod material used in this article. Dr. S. Taiti (Florence/Italy) gave advice for the identification of *A. anconanum*, he and Dr. S. Sfenthourakis (Nicosia/Cyprus) helped to improve the original manuscript. Dr. K. Wolf-Schwenninger (SMNS) operated the scanning electron microscope. To all of them I wish to express my sincere thanks.

2 A first Greek record of *Armadillidium anconanum* Verhoeff, 1928

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Verhoeff 1928: 98, 103, 108, fig. 6; Arcangeli 1954: 9 (see Manicastri & Taiti 1994); Manicastri & Taiti 1994: 142, figs. 8a–h; Argano et al. 1995: 21.

New material from Greece

7 ♂♂, 4 ♀♀, eastern Macedonia, Chalkidikí, Zográfou, humid stream valley, leg. S. Huber & A. Schönhofer, 22.VIII.2009 (SMNS 1996).

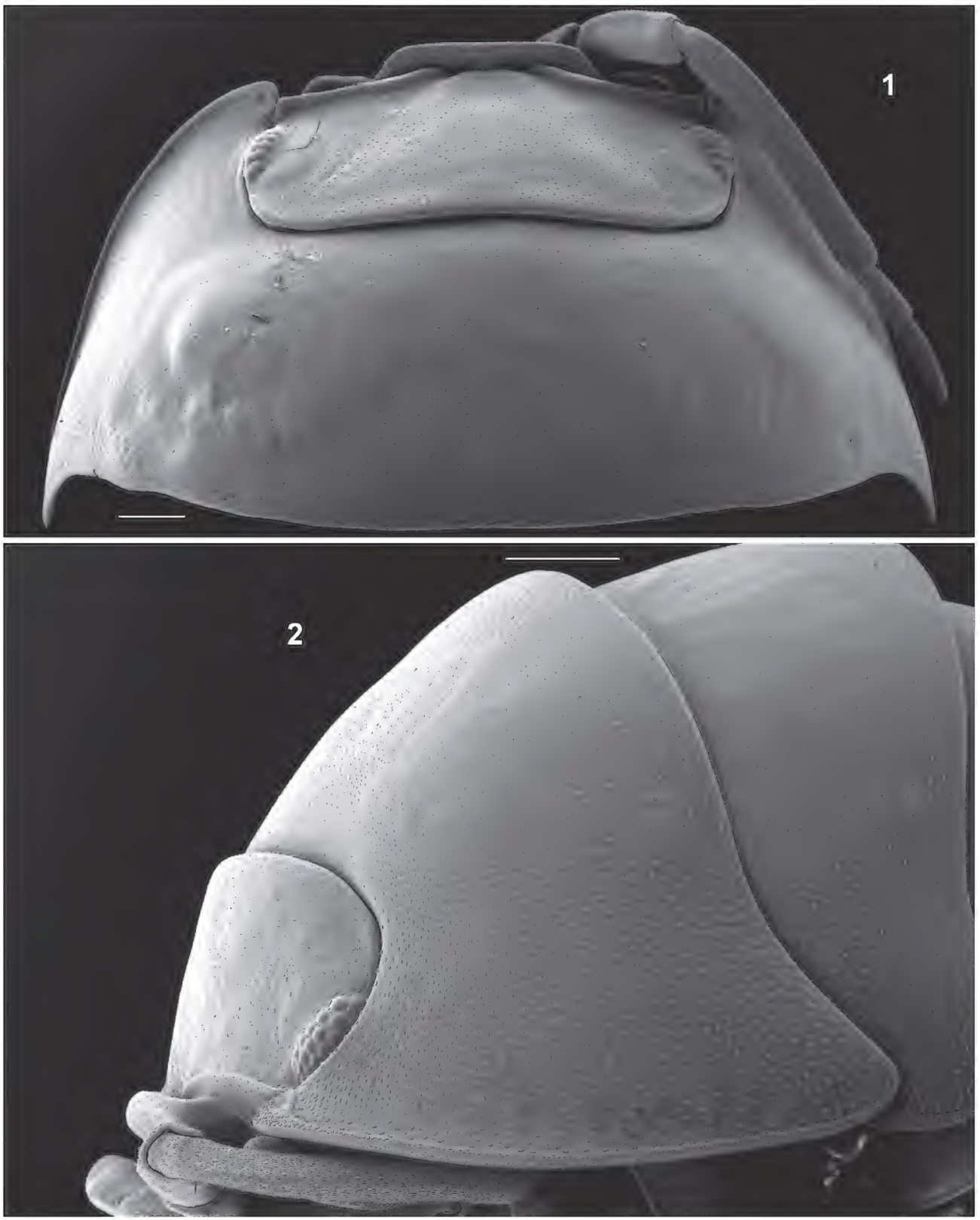
Diagnostic characters

Maximum dimensions: 15.0 × 7.3 mm.

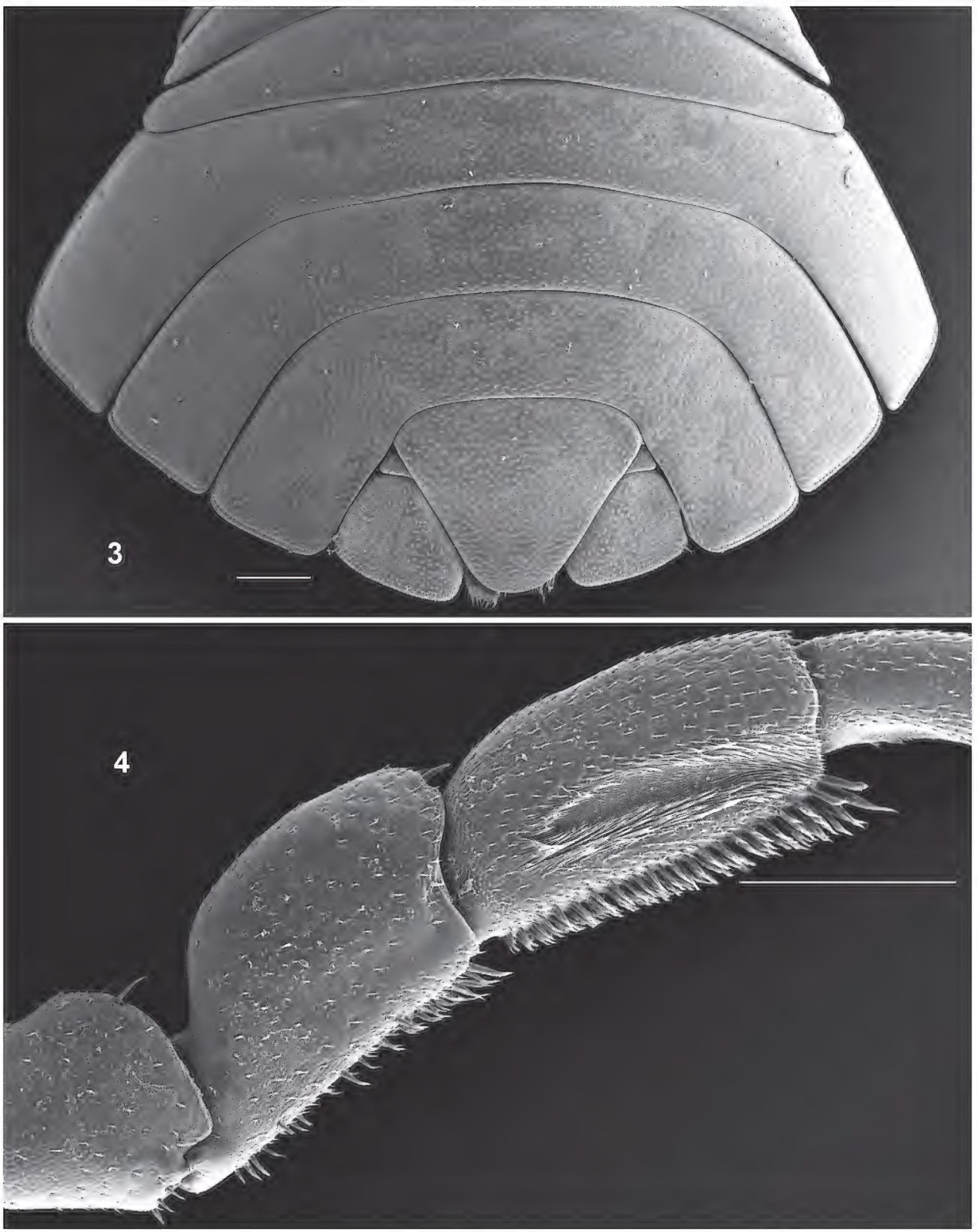
Coloration: Tergal parts blackish brown, partly mottled with yellowish speckles, more so in females.

Cuticular structures: Tergites smooth (Fig. 1).

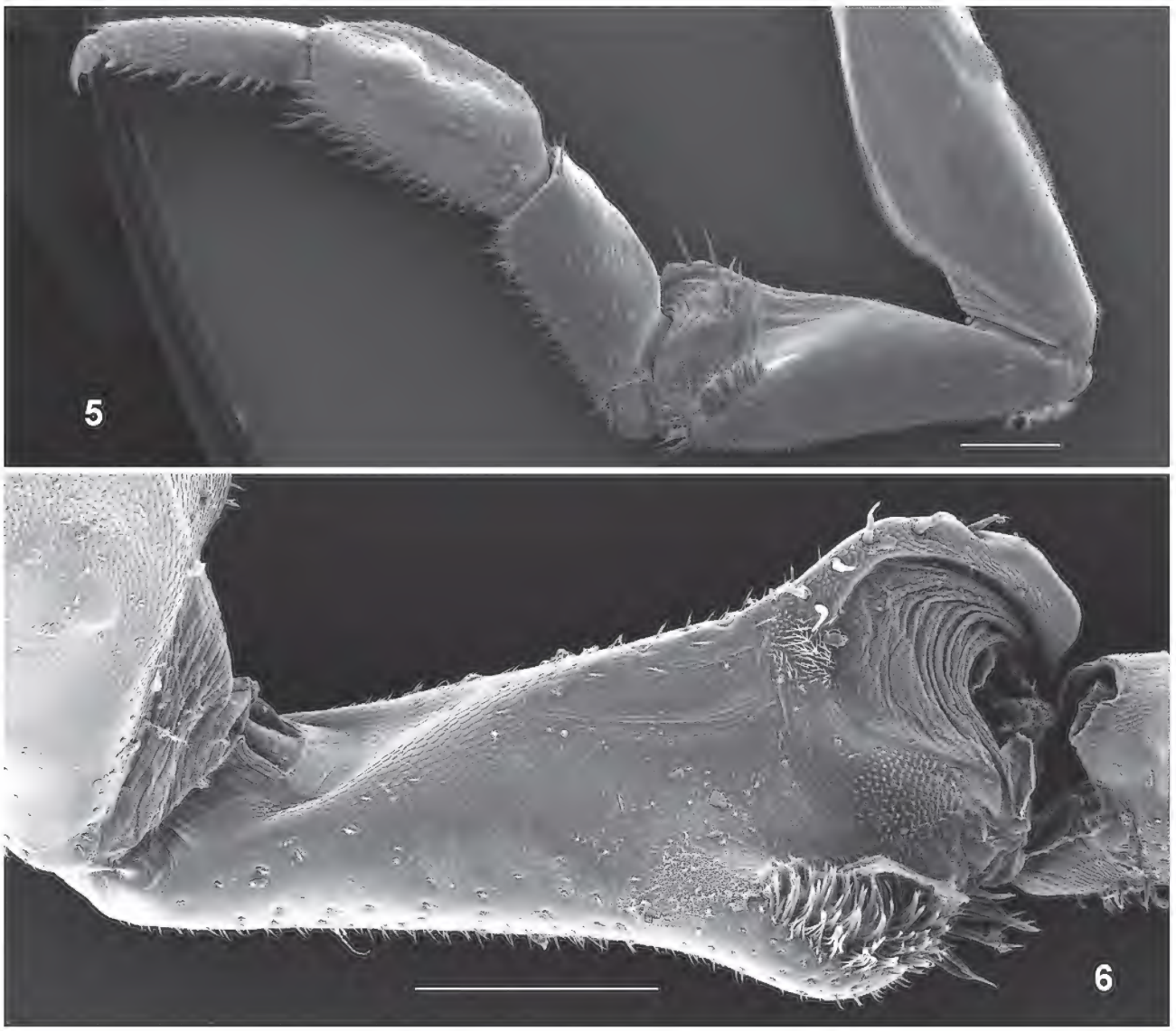
[1] 28th contribution see Stuttgarter Beiträge zur Naturkunde A, Neue Serie 5: 73–101 (2012).



Figs. 1–2. *Armadillidium anconanum* (Greece, Chalkidikí, SMNS 1996). – **1**. ♂, 16.5 × 7.3 mm, head and pereon-tergite 1, dorsal view. **2**. ♀, 12.0 × 5.5 mm, head and pereon-tergite 1, lateral view. – Scales: 0.5 mm.



Figs. 3–4. *Armadillidium anconanum* (Greece, Chalkidikí, SMNS 1996), ♂, 16.5 × 7.3 mm. – **3**. Pleon, dorsal view. **4**. Pereopod 1, frontal view. – Scales: 0.5 mm.



Figs. 5–6. *Armadillidium anconanum* (Greece, Chalkidikí, SMNS 1996), ♂, 16.5 × 7.3 mm. – **5**. Pereopod 7, frontal view. **6**. Ischium 7, frontodorsal view. – Scales: 0.5 mm.

Frontal shield from behind surpassing frontal margin, upper margin straight, laterally with obtuse angles (Fig. 1); lateral lobes bent backwards, in frontal view rounded trapezoidal. Pereon-epimeron 1 with frontal corner bent upwards, hind margin concave (Figs. 1, 2). Telson wider than long, with straight sides and broadly rounded apex (Fig. 3). Flagellum of antenna in adults with distal segment slightly longer than proximal one. Male carpus 1 with ventral brush of spines (Fig. 4). Male carpus 7 dorsally enlarged (Fig. 5). Ischium 7 frontally with protruding ridge and brush of spines (Figs. 5, 6). Male pleopod-exopodite 1 with very short pointed hind-lobe, medial margin convex (Fig. 7).

Distribution

Central eastern Italy (provinces Forlí, Pesaro, Ancona and Perugia, for detailed localities see Manicastri & Taiti 1994); Greece (probably introduced): eastern Macedonia, Chalkidikí, Zográfou (see map Fig. 8).

3 Remarks on *Armadillidium fossuligerum* Verhoeff, 1902

After the re-description of the type specimens of *A. fossuligerum* in Schmalfuss (2012) I had come to the conclusion that the species, as it was defined in Schmalfuss

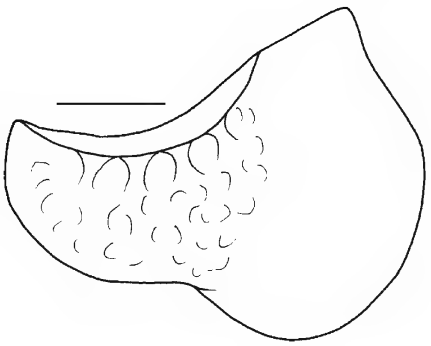


Fig. 7. *Armadillidium anconanum* (Greece, Chalkidikí, SMNS 1996), ♂, 16.5 × 7.3 mm, pleopod-exopodite 1, dorsal view. – Scale: 0.5 mm.

Fig. 8. First Greek record of *Armadillidium anconanum*.

(2008), should be split up in a number of very similar but morphologically separable species. A renewed very detailed investigation of all samples showed, however, that a high variability inside the samples leads to transitional forms which do not allow a clear separation into morphologically defined populations. This variability concerns shape and proportions of the frontal triangle (especially in dorso-caudal view), the hind margin of the pereon-epimeron 1, the shape and proportions of the telson, and the structure of the male ischium 7. So for the moment the most reasonable solution seems to keep this group as *A. fossuligerum* sensu lato, including also the material from ex-Yugoslavian Macedonia and from southwestern Bulgaria. Future research on this issue should also include molecular studies, which may help to define the systematic situation more clearly.

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Revision of the Oriental species of the genus *Caenis* Stephens (Insecta: Ephemeroptera: Caenidae)

Peter Malzacher

Abstract

29 described species of *Caenis* Stephens, 1835 are known from the Oriental Region. In this contribution, eight of these species are revised, five of them are declared as 'species inquirenda'. Seven new species of *Caenis* are described herein: *Caenis nigropunctatula* **n. sp.** (Sumatra, Java, Thailand), *C. ranauensis* **n. sp.** (Sumatra), *C. ulmeriana* **n. sp.** (Sumatra, Java, Thailand), *C. maratha* **n. sp.** (India), *C. guttata* **n. sp.** (Thailand), *C. gephyria* **n. sp.** (Thailand), and *C. incurva* **n. sp.** (India). A key is provided for 14 species that can be differentiated by modern diagnostic criteria.

K e y w o r d s : *Caenis*, revision, new species, Oriental Region.

Zusammenfassung

Aus der Orientalischen Region sind 29 beschriebene Arten von *Caenis* Stephens, 1835 bekannt. In diesem Beitrag werden acht davon revidiert und fünf als 'species inquirenda' eingestuft. Sieben neue Arten der Gattung *Caenis* werden beschrieben: *Caenis nigropunctatula* **n. sp.** (Sumatra, Java, Thailand), *C. ranauensis* **n. sp.** (Sumatra), *C. ulmeriana* **n. sp.** (Sumatra, Java, Thailand), *C. maratha* **n. sp.** (Indien), *C. guttata* **n. sp.** (Thailand), *C. gephyria* **n. sp.** (Thailand) und *C. incurva* **n. sp.** (Indien). Für 14 Arten, die nach modernen diagnostischen Kriterien unterschieden werden können, wird ein Bestimmungsschlüssel erstellt.

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2 Material and methods 28
3 Systematic account 28
4 Key to males of Oriental *Caenis* 45
5 Conclusions 46
6 References 46

1 Introduction

The following described species of *Caenis* are known from the Oriental Region: *Caenis perpusilla* Walker, 1853, *C. nigropunctata* Klapálek, 1905, *C. annulata* Navás, 1923, *C. pumila* Navás, 1923, *C. philippinensis* Ulmer, 1924, *C. nigrostriata* Navás, 1932, *C. srinagari* Traver, 1939, *C. picea* Kimmins, 1947, *C. piscina* Kimmins, 1947, *C. demoulini* van Bruggen, 1954, *C. dangi* Soldán, 1986, *C. kimminsis* Ali, 1967, *C. argillosa* Kang & Yang, 1994, *C. bella* Kang & Yang, 1994, *C. corniga* Kang & Yang, 1994, *C. corpulenta* Kang & Yang, 1994, *C. granifera* Kang & Yang, 1994, *C. montana* Kang & Yang, 1994, *C. nitida* Kang & Yang, 1994, *C. yangi* Kang & Yang, 1996, *C. aspera* Tong & Dudgeon, 2002, *C. bicornis* Tong & Dudgeon, 2002, *C. lubrica* Tong & Dudgeon, 2002, *C. pycnacantha* Jia, Qin, Ju & Zhou, 2010, *C. abdita* Malzacher, 2013, *C. bidigitata* Malzacher, 2013, *C. fregatula* Malzacher, 2013, *C. sebastiani* Malzacher, 2013, and *C. unidigitata* Malzacher, 2013.

The descriptions of nearly all Oriental *Caenis* species published during the 20th century are insufficient and useless for an exact determination. Nonetheless a lot of records from this period were earlier determined as *C. perpusilla* and *C. nigropunctata*. At present it seems to be impossible to clarify at least some of these records.

The present paper gives an overview of the Oriental *Caenis* species that can be described (or redescribed) by providing modern diagnostic characters. Types and/or other material were available to me from the following species: *Caenis perpusilla*, *C. nigropunctata*, *C. philippinensis*, *C. annulata*, *C. pumila*, *C. nigrostriata*, *C. picea*, and *C. piscina*. These taxa are revised in the present paper and their taxonomic status is clarified. Additionally the following seven new species are described: *Caenis nigropunctatula* n. sp., *C. ranauensis* n. sp., *C. ulmeriana* n. sp., *C. maratha* n. sp., *C. guttata* n. sp., *C. gephyria* n. sp., and *C. incurva* n. sp.

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(Lunz), Michel Sartori (Lausanne), Olaguer Escolá (Barcelona) and Benjamin Price (London) for material and the loan of type specimens. Thanks are extended to Susanne Leidenroth (Staatliches Museum für Naturkunde Stuttgart) for taking SEMs and Carlos Monje (Staatliches Museum für Naturkunde Stuttgart) for his efforts in genetic barcoding. Arnold Staniczek (Stuttgart) and Michel Sartori (Lausanne) kindly read the manuscript and provided valuable suggestions.

2 Material and methods

The initial impetus for this paper was the examination of the large *Caenis* collection in the Zoologisches Museum, Hamburg that not only contains the types of *C. nigropunctata*, but also additional material of *Caenis* from the Ulmer collection, all identified as *C. nigropunctata* by Ulmer. Additionally, I could study samples of Oriental *Caenis* located in my own collection and material I recently received from the Musée Cantonal de Zoologie, Lausanne. Also available were some types of species described by Longinos Navás, deposited in the Museo de Zoologia de Ayuntamiento, Barcelona, and types of *C. perpusilla*, *C. picea* and *C. piscina* from the Natural History Museum, London.

The types of the herein described species *Caenis nigropunctatula* n. sp., *C. ranauensis* n. sp., and *C. ulmeriana* n. sp. are deposited in the Zoologisches Museum, Hamburg, of *C. guttata* n. sp. and *C. gephyria* n. sp. in the Musée Cantonal de Zoologie, Lausanne and of *C. maratha* n. sp. and *C. incurva* n. sp. in the Natural History Museum, London. A few paratypes of the first three species are also preserved in the author's collection.

Specimens used for SEM were dehydrated through a stepwise immersion in ethanol and then dried by critical point drying. The mounted material was coated with a 20 nm Au layer, examined and photographed with a Zeiss EVO LS 15 scanning electron microscope. Digital photographs were enhanced by using Photofiltre 6.5.2 (http://www.photofiltre-studio.com).

The attempt to clarify the taxonomic status of *C. nigropunctata* by extracting and identifying its COI sequence out of dried historical type material unfortunately yielded no results, probably due to DNA degradation over the ages.

3 Systematic account

Caenis nigropunctata Klapálek, 1905

Klapálek (1905: 104); Ulmer (1924: 46); Ulmer (1939: 520, 635).

Material examined

Syntypes: 20 ♀♀, Java, Buitenzorg, 24.II.–12.III.1904, K. Kraepelin leg.

All type specimens of *Caenis nigropunctata* described by Klapálek (1905) are females in dried condition. An identification on the base of modern differential-diagnostic features is therefore impossible.

The redescription of *Caenis nigropunctata* by Ulmer (1939) is based on an extensive material mainly collected in the year 1929. The investigation of this material revealed that it contains three *Caenis* species that are described below. As the attempt to identify one of these species as *C. nigropunctata* by COI comparison was not successful, *C. nigropunctata* is declared as 'species inquirenda'.

Caenis nigropunctatula **n. sp.**
(Figs. 1a–l, 2a–e, 4l, 8–15)

Holotype ♂ (on microslide): R26, Sumatra, Ranau, 28.I.1929, A. Thienemann leg.

Paratypes: same data as holotype, 56 ♂♂, 26 ♀♀.

Other material: R18a, Sumatra, Ranau, 28.I.1929, A. Thienemann leg., 20 larvae. – R4c, Sumatra, Ranau, 21.I.1929, A. Thienemann leg., 2 larvae. – Sumatra, Balige, lake Toba, 3.IV.1929, A. Thienemann leg., 25 ♂♂. – FT15, Sumatra, Pangururan, lake Toba, 12.IV.1929, 1 ♂. – F32a, Sumatra, Fort de Kock, 13.III.1929, several ♂♂. – Sumatra, Kalung (Kamang), XII.1913, several ♂♂. – Java, Buitenzorg (Bogor), 13.III.1921, 11 ♂♂. – Thailand, Ayutthaya, 100°34′E, 14°25′N, 3.IV.1989, H. Malicky leg., 11 ♂♂, 4 ♀♀. – Thailand, Nan, 24.–26.XI.2001, R. Grimm leg., 22 ♂♂.

Etymology

As most of the specimens of the Ulmer material (originally attributed to *C. nigropunctata*) belong to this species and because the name *C. nigropunctata* is widely distributed in literature, I chose the only slightly changed species epithet *C. nigropunctatula*.

Description

Male imago

Measurements, ratios and colouration

Body length: 2.6–3.3 mm; wing length: 2.2–2.5 mm; length of fore leg: 2.1–2.6 mm. Head ratios (see Fig. 4k): c : a = 2.4–2.8, a : b = 0.9–1.1; ratio of fore femur : fore tibia = 0.52–0.64; ratio of fore tibia : fore tarsus = 1.15–1.26 (Buitenzorg), 1.29–1.34 (Ranau), 1.13–1.35 (Thailand); ratio of fore leg : hind leg = 1.73–1.85 (Buitenzorg), 1.83–1.90 (Ranau), 1.46–1.69 (Thailand); ratio of segments of fore tarsus 1^{st} : 2^{nd} : 3^{rd} : 4^{th} : 5^{th} = 1 : 3.9–4.6 (Buitenzorg), 2.9–3.8 (Ranau, Thailand) : 2.0–2.8 (Buitenzorg, Ranau), 1.7–2.0 (Thailand) : 1.7–2.2 (Buitenzorg, Ranau), 1.5–1.8 (Thailand) : 1.5–1.7 (Buitenzorg), 1.1–1.4 (Ranau, Thailand); ratio of body length : length of cercus : length of terminal filament = 1 : 2.5–2.7 : 3.5–3.8; ratio terminal filum : cercus = 1.3–1.4.

Colouration and pigmentation of the Ulmer material is not preserved. The Thailand material is coloured as follows:

Colouration of cuticle: Thorax brownish; other parts yellowish to white.

Epidermal pigmentation: Vertex with two more or less intense grey transverse bands. Pronotum laterally shaded, with two paramedian black spots. Sutures of mesonotum more or less greyish. Abdominal terga I–II with lateral spots, III–VI (VII) with relatively narrow transverse

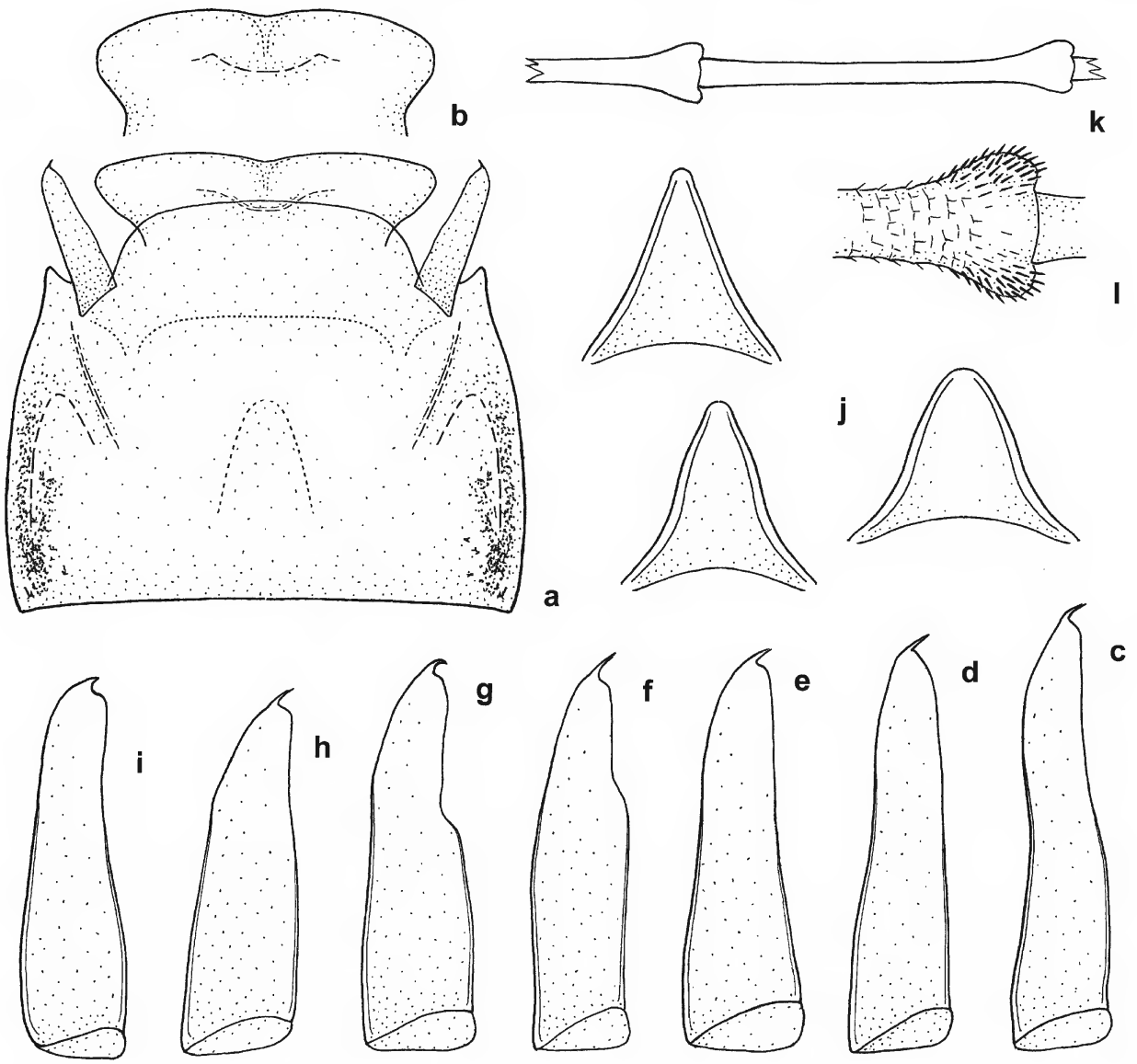


Fig. 1. *Caenis nigropunctatula* n. sp., ♂. – **a**, **b**. Genitalia. **c–i**. Different shape of forcipes. **j**. Prosternal triangle. **k.** Tarsomeres 2 and 3 of fore tarsus. **l**. Fore tarsus, detail: apical end of tarsomere 2.

bands, (VII) VIII–X diffusely shaded or white. Blackish paratergal spots. Coxae often with grey spots and surrounding dashes. Base of mouthparts and lateral parts of ventral head greyish. Femora with intense preapical dashes.

Morphology

Head (Fig. 4l): Fore margin between lateral and frontal ocelli straight. Eyes and lateral ocelli large. Distance between inner margins of lateral ocelli relatively short. Base of antennal flagellum not dilated.

Thorax: Prosternal ridges strong, forming an isosceles triangle, sides more or less S-shaped; without transverse strip (Fig. 1j). Tarsomeres 2–4 of fore tarsus apically broadened (Fig. 1k); broadenings equipped with small strong spines (Fig. 1l).

Abdomen: Lateral filaments of abdominal segments short or (Thailand specimens) moderate. Without finger-like process on tergum II.

Genitalia and sternum IX as in Figs. 1a, b. Penis broad, with rounded lobes of moderate length, hind margin sometimes with a more or less pronounced medial incision. Styliger sclerite broad with short apophyses. Forcipes relatively short, slightly narrowed to the tip, with a short spine, more or less bent medially, sometimes 2–3 spines which are nearly totally fused together (Figs. 1c–i).

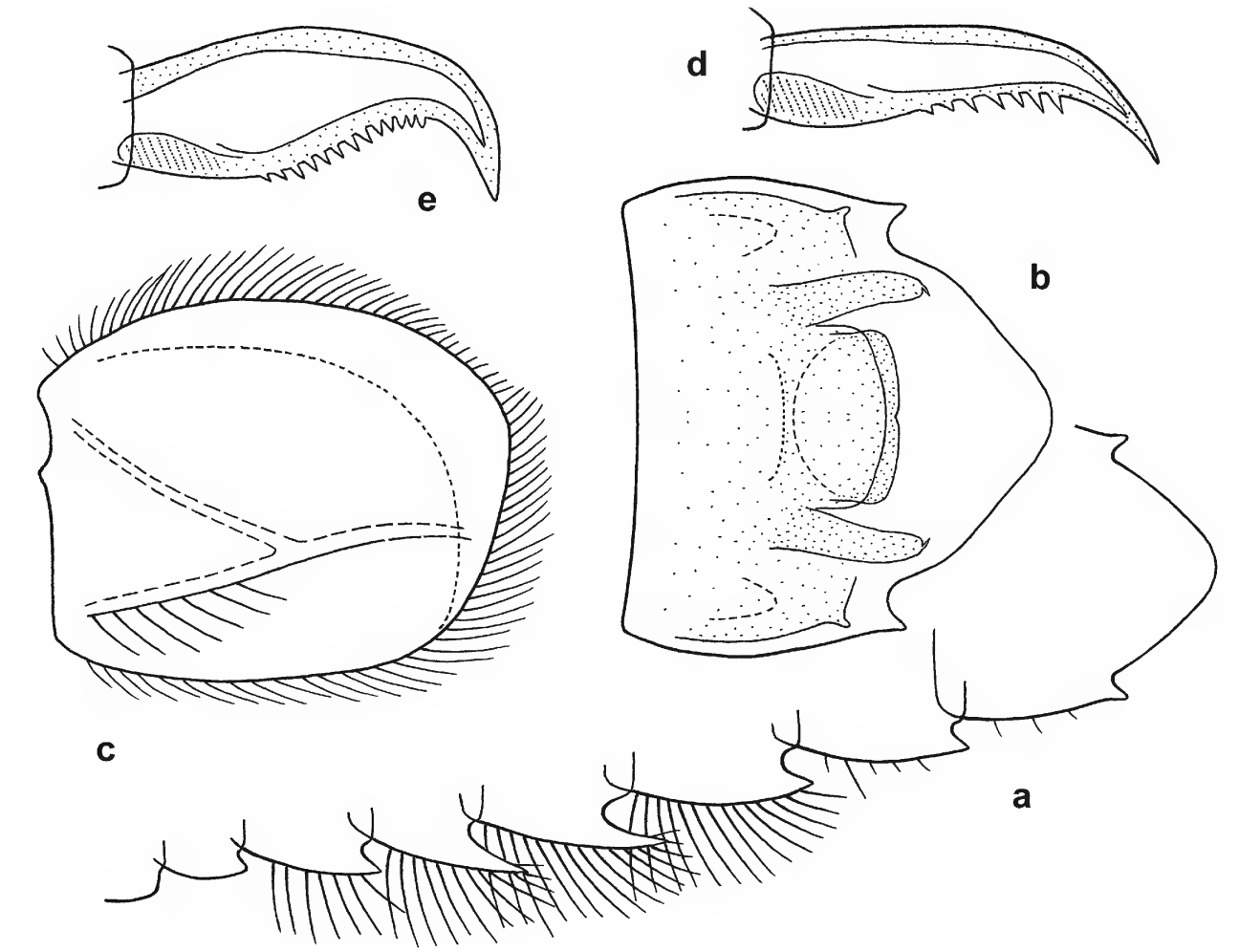


Fig. 2. *Caenis nigropunctatula* n. sp., larva. – **a**. Outline of abdomen with marginal setation. **b**. Sternum IX, ♂, with subimaginal genitalia. **c**. Operculate gill, general view. **d**. Claw of fore leg. **e**. Claw of hind leg.

Female imago

Measurements and colouration

Body length: 4.5–5.2 mm; wing length: 2.7–3.8 mm.

Colouration and pigmentation similar to the males, bands on abdominal terga a little broader and stronger.

Morphology not different from males.

Egg

Chorion finely pored. Micropyle very short, triangular, about as long as diameter of sperm-guide (Fig. 8). Two flat epithemata of coiled-rope-type (Figs. 8–11). Epithemata of a modified *C. perpusilla* subtype (compare Malzacher 2011: figs. 13, 34, 35 and Malzacher 2013: figs. 18–20), with 6–8 threads emerging from the poles (Figs. 9, 10, 11). Threads are forming loops by turning about (Figs. 9, 10). About 5 terminal knobs give end to about 3–7 threads (Fig. 9).

This subtype of epithemata was described for the first time by Smith 1935 (fig. 34) for the eggs of *Caenis perpusilla*. In the present paper this species is regarded as 'species inquirenda' (see below). Nevertheless I will maintain the name for the described epithema subtype.

Larva

The assignment to the males is based on a larva with visible subimaginal genitalia, showing short forcipes with a small apical spine. The herein described larva is not identical with any of the larvae described by Kang & Yang (1994) from Taiwan, the imagines of which are unknown.

Measurements and colouration

Male larva, last instar body length 3.5 mm, length of cerci 2.5 mm; female larva of last instar, body length 5.0 mm, length of cerci 3.5 mm.

Colouration and pigmentation of the ULMER material is not preserved.

Morphology

Cuticle smooth, with numerous, very different bristles or microtrichia: bifurcated with two or more branches on margins of femora (Fig. 13), tongue-shaped on dorsal side of femora and on abdominal terga VIII–X (Fig. 12), and shield-shaped on head, pro- and mesonotum and operculate gills (Fig. 14). There are also intermediate stages between these forms.

Head: Genae not bulging out. Pedicle with about 10 strong bristles. Labrum with broadly rounded corners and a shallow indentation. Mandibles with a group of long, bent setae on lateral margin. Second segment of labial palp about as long as the third (along the centre-line); outer margin with about 6–8 very long bristles. Sides of postmentum posteriorly diverging.

Thorax: Sides of pronotum straight or slightly concave, more or less diverging anteriorly. Coxal processes inconspicuous, forming small ridges. There is no transverse row of bristles on dorsal side of fore femur, only an irregular longitudinal row of a few bristles, sometimes even only one or two bristles present. Fore tarsus ventrally with an irregular row of pinnate bristles, often simple at the base of the row. Mid and hind tarsus ventrally with two irregular rows or a band of numerous pinnate bristles. Ventral sides of all tibiae also covered with a great number of those pinnate bristles. Claws with a row of strong denticles, fore claw relatively slender (Fig. 2d), mid and hind claws broad and stocky, with strongly bent apical third; hind claw with homodont dentition (Fig. 2e).

Abdomen: Abdominal segments with posterolateral processes of different length; segments V and VI long, VII–IX shorter and broader. Segments IV–VII with long, bent bristles, segments VIII and IX only with a few short ones. Sides of segment IX often slightly S-shaped (Fig. 2a). Posteriomedian process of tergum II short, broadly triangular with rounded tip. Hind margins of terga VII and VIII with long bristles, of terga IX and X with denticles. Hind margin of sternum IX posteriorly protruding, forming a triangular plate with rounded tip (Figs. 2a, b); dorsal side without shagreen. Margins of operculate gills densely provided with long, often frayed bristles, a few short bifurcate ones on posterolateral corner. Y-shaped ridges well developed, median ridge slightly keeled, its basal half with 6–8 bristles similar to that from lateral margin. Ventral row of microtrichia and lateral margin posteriorly diverging, reaching posterior-median corner of gill (Fig. 2c). Microtrichia very elongated (Fig. 15), shorter on the ends of the row (Fig. 15, small frame). A couple of spatulate pinnate bristles basally on ventral side. Gill I two-thirds as long as gill II, with only a few, relatively short bristles.

Differential diagnosis

Caenis nigropunctatula can be distinguished from all other *Caenis* species by the following combination of characters: Male imago: Forcipes slightly narrowed to the tip, with a short spine, more or less bent medially, sometimes 2–3 spines which are nearly totally fused together. Tarsomeres 2–4 of fore tarsus apically broadened; broadenings with small strong spines, not tongue-shaped. Ratio of fore femur : fore tibia = more than 0.46. Ratio of fore leg : hind leg = less than 1.90. Penis broad, with rounded lobes of moderate length. Styliger sclerite with short apophyses.

Larva: Second segment of labial palp about as long as the third. Sides of pronotum straight or slightly concave, more or less converging anteriorly. Bristles on fore femur in a longitudinal row or band, no transverse row. Tarsi and tibiae ventrally with a great number of long, pinnate bristles. Abdominal segments IV–VII laterally with long bristles, other segments with a few very short and thin bristles or without any bristles. Hind margin of sternum IX posteriorly protruding, forming a triangular plate with rounded tip. Ventral row of microtrichia and lateral margin posteriorly diverging, the row reaching the posteromedian corner.

Remarks

Caenis nigropunctatula seems to be a species with characters broadly varying in different populations and geographical races, such as length ratios of fore femur to fore tibia and fore leg to hind leg. The male genitalia, however, are very similar. Therefore it is not possible to divide the complex into different species by morphological characters.

Caenis ranauensis **n. sp.**

(Figs. 3a–k)

Holotype ♂ (on microslide): R9, Sumatra, lake Ranau, southern shore, 23.I.1929, A. THIENEMANN leg.

Paratypes: same data as holotype, several hundred ♂♂.

Other material: FZ, Bali, Munduk, 12.VI.1929, H. J. FEUERBORN leg., 1 ♂.

Etymology

The name refers to lake Ranau. Its southern shore is the locus typicus of the new species.

Description

Male imago

Measurements, ratios and colouration

Body length: 2.7–3.0 mm; wing length: 2.0–2.3 mm; length of fore leg: 2.3–2.5 mm. Head ratios (see Fig. 4k):

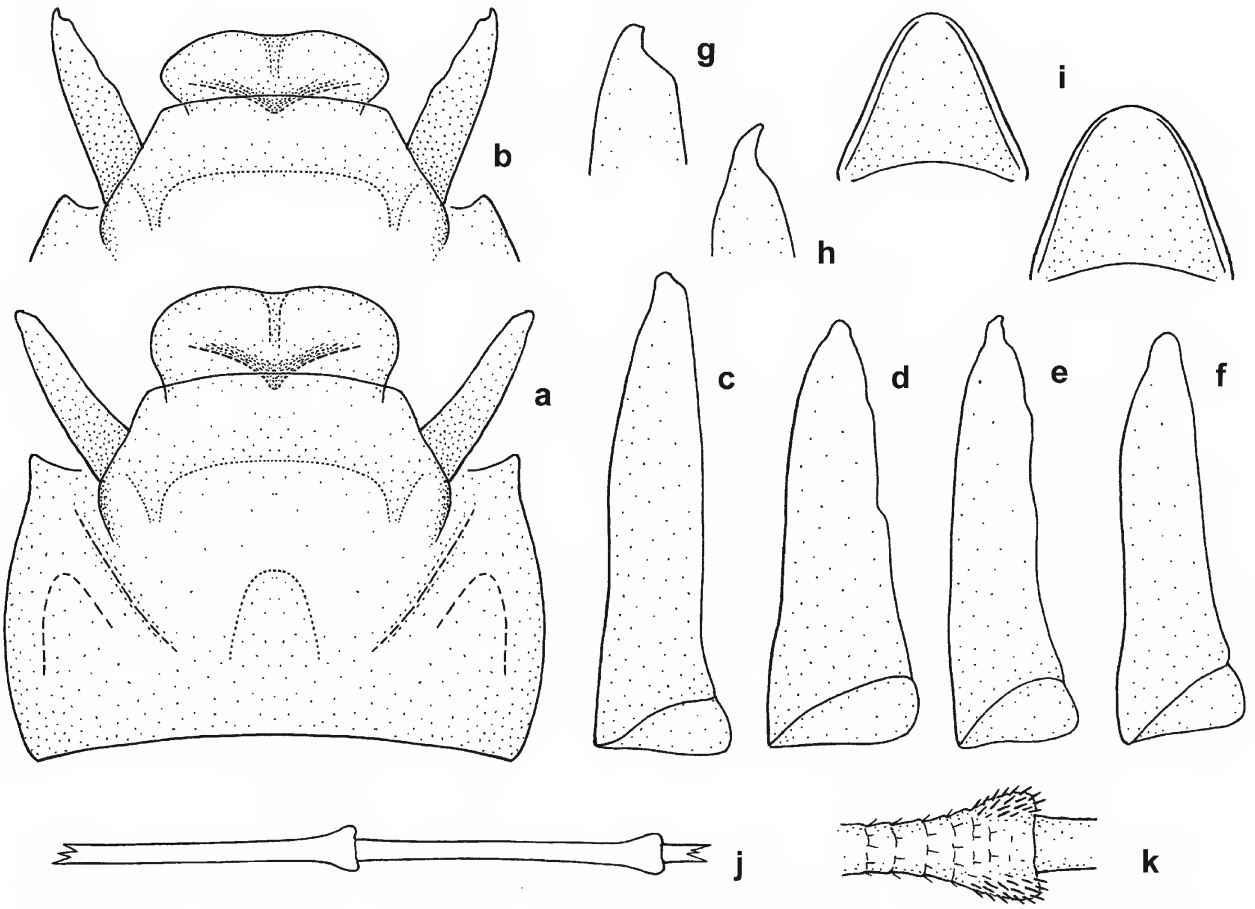


Fig. 3. *Caenis ranauensis* n. sp., ♂. – **a**, **b**. Genitalia. **c–h**. Different shape of forcipes. **i**. Prosternal triangle. **j**. Tarsomeres 2 and 3 of fore tarsus. **k**. Fore tarsus, detail: apical end of tarsomere 2.

c : a = 1.8–2.0, a : b = 1.4–1.5; ratio of fore femur : fore tibia = 0.46–0.50; ratio of fore tibia : fore tarsus = 1.27–1.33; ratio of fore leg : hind leg = 2.03–2.15; ratio of segments of fore tarsus 1st : 2nd : 3rd : 4th : 5th = 1 : 3.7–4.4 : 1.8–2.5 : 1.3–1.7 : 1.3–1.4; ratio of body length : length of cercus : length of terminal filament = 1 : 3.3–3.4 : 3.7–4.1; ratio terminal filum : cercus = 1.2.

Colouration and pigmentation is not preserved.

Morphology

Head: Fore margin between lateral and frontal ocelli slightly bowed. Eyes and lateral ocelli clearly smaller as in *C. nigropunctatula*. Distance between inner margins of lateral ocelli relatively long. Base of antennal flagellum not dilated.

Thorax: Prosternal triangle broad, with slightly convex sides and broadly rounded tip. Without transverse strip (Fig. 3i). Tarsomeres 2–4 of fore tarsus apically broadened; broadenings equipped with small strong spines (Figs. 3j, k).

Abdomen: Lateral filaments of abdominal segments short. Without finger-like process on tergum II.

Genitalia and sternum IX as in Figs. 3a, b. Penis not as broad as in *C. nigropunctatula*, lobes short or very short broadly rounded, posteroventrally with a broadly V-shaped, brownish sclerite. Styliger sclerite broad, with moderate apophyses. Shape of forcipes variable, more or less narrowed to the tip, apex rounded, often with short bumps or projections of different shape (Figs. 3c–h).

Female imago and larva unknown.

Differential diagnosis

Caenis ranauensis can be distinguished from all other *Caenis* species by the following combination of characters:

Male imago: Forcipes slightly narrowed to the tip; apex rounded, often with short projections of different shape. Tarsomeres 2–4 of fore tarsus apically broadened; broadenings with small strong spines, not tongue-shaped. Ratio

of fore femur : fore tibia = less than 0.50. Ratio of fore leg : hind leg = more than 2.03. Penis posteroventrally with a broadly V-shaped brownish sclerite. Styliger sclerite broad, with moderate apophyses.

Caenis ulmeriana **n. sp.**
(Figs. 4a–k)

Holotype ♂ (on microslide): R26, Sumatra, Ranau, 28.I.1929, A. Thienemann leg.

Paratypes: same data as holotype, 65 ♂♂, 7 ♀♀.

Other material: Sumatra, Singkarak, II.1929, 2 ♂♂. – Java, Klakah, XI.1928, 10 ♂♂. – Thailand, riv. Ping, Lamphun, 22.XII.1989, H. Malicky leg., 10 ♂♂. – Thailand, riv. Thanlwin Myit, Mae Hong Son, 18.XI.1998, R. Grimm leg., 2 ♂♂. – Thailand, riv. Kwai, 5.II.2006, coll. J.-M. Elouard, 23 ♂♂. – Sumatra, Barat, Ombilin, outlet of Singkarak Lake, 100°34′38″E, 0°32′59″S, 26.V.2010, coll. J.-M. Elouard, 1 ♂.

Etymology
The species is named in honour of Georg Ulmer (Hamburg), the famous German entomologist, who redescribed *Caenis nigropunctata* in 1939.

Description

Male imago

Measurements, ratios and colouration
Body length: 2.4–2.6 mm; wing length: 1.9–2.2 mm; length of fore leg: 1.9–2.1 mm. Head ratios (see Fig. 4k):

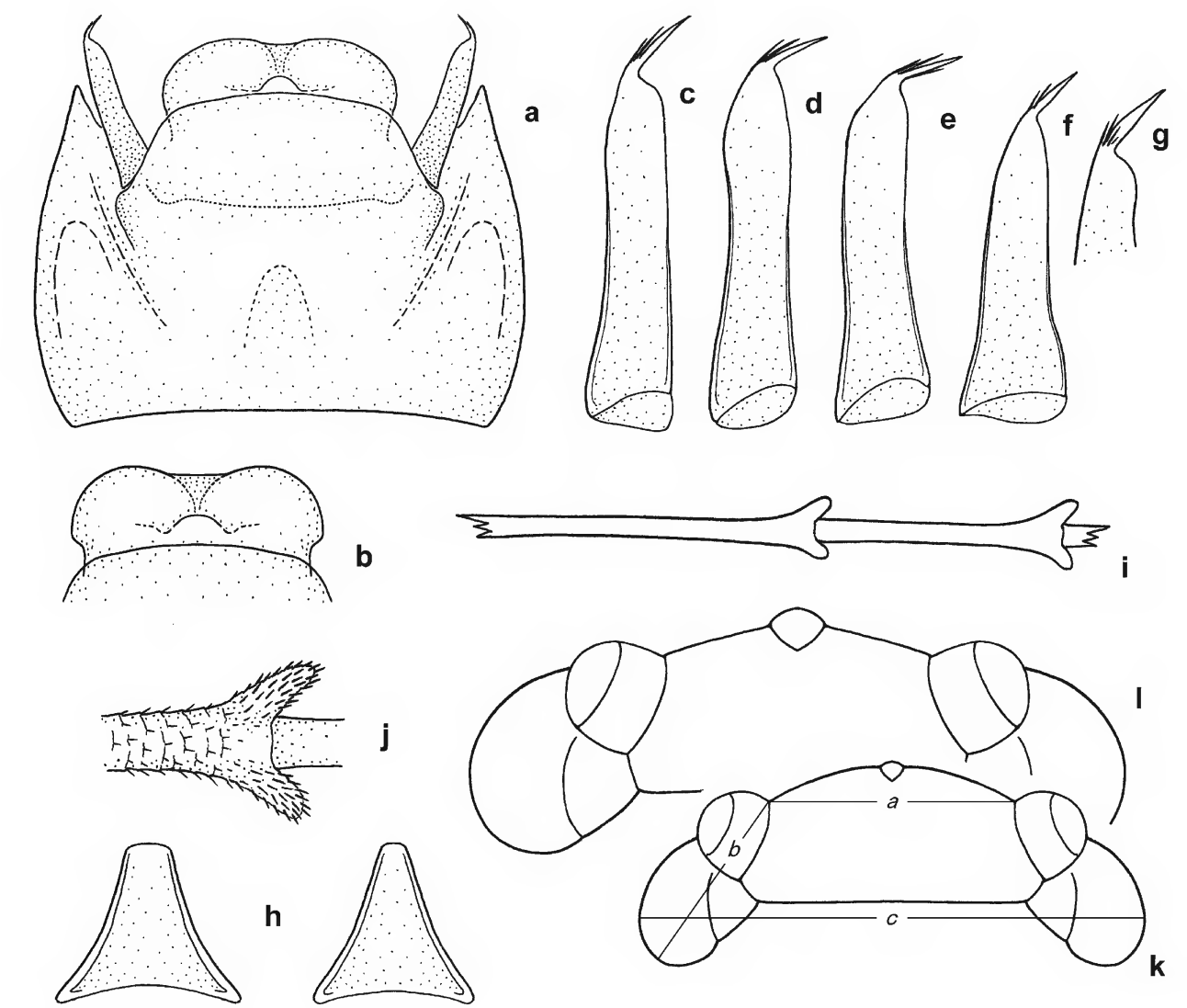


Fig. 4. *Caenis ulmeriana* n. sp., ♂ (a–k) and *C. nigropunctatula* n. sp., ♂ (l). – **a**, **b**. Genitalia. **c–g**. Different shape of forcipes. **h**. Prosternal triangle. **i**. Tarsomeres 2 and 3 of fore tarsus. **j**. Fore tarsus, detail: apical end of tarsomere 2. **k**, **l**. Head, dorsal view.

c : a = 1.9–2.1, a : b = 1.3–1.5 (in the Thailand specimens from river Kwai, but not in that from river Ping, the head proportions are closer to those of *C. nigropunctatula*); ratio of fore femur : fore tibia = 0.36–0.45; ratio of fore tibia : fore tarsus = 1.35–1.53; ratio of fore leg : hind leg = 2.10–2.35; ratio of segments of fore tarsus 1^{st} : 2^{nd} : 3^{rd} : 4^{th} : 5^{th} = 1 : 4.3–5.2 : 2.5–3.2 : 1.5–1.9 : 0.9–1.2; ratio of body length : length of cercus : length of terminal filament = 1 : 2.6 : 4.2; ratio terminal filum : cercus = 1.5–1.6.

Colouration and pigmentation of the ULMER material is not preserved. The Thailand material and the specimen from Sumatra is coloured as follows:

Colouration of cuticle: Thorax light yellowish-brown; other parts white.

Epidermal pigmentation: Frons blackish or grey. Vertex with two more or less intense blackish transverse bands, the posterior one often devided into two spots or dashes. Pronotum with a transverse black line and two paramedian spots. Sutures of mesonotum more or less blackish. Scutellum strongly pigmented. Metanotum and thoracic tergites I and II often with transverse bands or dashes. Pleura with black spots and dashes, particularly on ventral part and on prealar bridges. Abdominal terga I–VI (IX) with sublateral spots more or less extended medially, occasionally forming transverse bands.

Morphology

Head (Fig. 4k): Fore margin between lateral and frontal ocelli slightly bowed. Eyes and lateral ocelli clearly smaller as in *C. nigropunctatula*. Distance between inner margins of lateral ocelli relatively long. Base of antennal flagellum not dilated.

Thorax: Prosternal triangle with concave sides, tip more or less broadly rounded (Fig. 4h), without transverse strip. Tarsomeres 2–4 of fore tarsus apically with tongue-shaped projections, provided with short strong spines (Figs. 4i, j). Segment V extremely short (in specimens from the river Ping, tongue-shaped projections are a little shorter).

Abdomen: Lateral filaments of abdominal segments short. Without finger-like process on tergum II.

Genitalia and sternum IX as in Figs. 4a, b. Penis not as broad as in *C. nigropunctatula*, lobes very broadly rounded, hind margin of each half convex. Penis mediolaterally with a tongue-shaped process. Styliger sclerite broad without (Indonesia) or only with very short apophyses (Thailand). Forcipes with more or less parallel sides and a long tuft of spines, consisting of one strong spine and a few thin ones, more or less fused (Fig 4c–e). Forcipes of males from Thailand are shorter and basally broadened (Fig. 4f), in the specimens from river Ping the strong spine is very voluminous (Fig. 4g).

Female imago

Besides the male paratypes also seven females were designated as paratypes, but these cannot be assigned to the males with certainty.

Larva unknown.

Differential diagnosis

Caenis ulmeriana can be distinguished from all other *Caenis* species by the following combination of characters: Male imago: Forcipes relatively short, straight, with an apical tuft of one strong spine and 3–4 thin spines, sometimes more or less fused together. Tarsomeres 2–4 of fore tarsus apically with tongue-shaped projections, provided with short, strong spines, segment 5 extremely short. Ratio of fore femur : fore tibia = less than 0.45. Ratio of fore leg : hind leg = more than 2.10. Penis mediolaterally with a tongue-shaped process. Penis lobes very broadly rounded, hind margin of each penis half convex. Styliger sclerite without or with only very short apophyses. On the morphological differences to *C. nigropunctatula* and *C. ranauensis* see Tab. 1.

Remarks

Caenis ulmeriana is distributed from Thailand to Java. Some characters are variable and more or less different between continental and island populations.

Tab. 1. Comparison of characters of three species of *Caenis*.

	C. nigropunctatula	*C. ulmeriana*	*C. ranauensis*
ratio fore femur : fore tibia	0.52–0.64	0.36–0.45	0.46–0.50
ratio fore leg : hind leg	1.46–1.90	2.10–2.35	2.03–2.15
head, fore margin	straight	bowed	bowed
fore tarsus segment 2–4, apex	broadened	with long processes	slightly broadened
penis, tongue-shaped process	no	yes	no
penis, V-shaped sclerite	no	no	yes
apophyses styliger sclerite	short	very short or lacking	moderate
forceps, apically	one strong spine	tuft of long spines	rounded, tip variable

Caenis maratha **n. sp.**
(Figs. 5a, b)

H o l o t y p e ♂ (on microslide): India, Poona, Maharashtra, 4.IX.1945, M. T. GILLIES leg.

P a r a t y p e s : same data as holotype, 2♂♂.

Etymology

The species epithet is a noun in apposition and refers to the Indian people Maratha, predominantly living in the Indian state of Maharashtra.

Description

M a l e i m a g o

Measurements, ratios and colouration

Body length: 2.2–2.5 mm; wing length: 2.0–2.3 mm; length of fore leg: 2.1–2.4 mm. Ratio of fore femur : fore tibia = 0.49–0.51; ratio of fore tibia : fore tarsus = 1.46–1.58; ratio of fore leg : hind leg = 1.85–1.95; ratio of segments of fore tarsus 1^{st} : 2^{nd} : 3^{rd} : 4^{th} : 5^{th} = 1 : 4.2–4.6 : 3.0–3.3 : 2.1–2.3 : 1.3–1.5.

Colouration and pigmentation is not preserved.

Morphology

Head: Base of antennal flagellum not dilated.

Thorax: Prosternal triangle elongated with concave sides, tip more or less rounded, without transverse strip. Tarsomeres 2–4 of fore tarsus apically broadened; broadenings equipped with small strong spines.

Abdomen: Lateral filaments of abdominal segments short. Without finger-like process on tergum II.

Genitalia and sternum IX as in Fig. 5a. Penis narrow, more or less semicircular, without bulging lobes; ventral

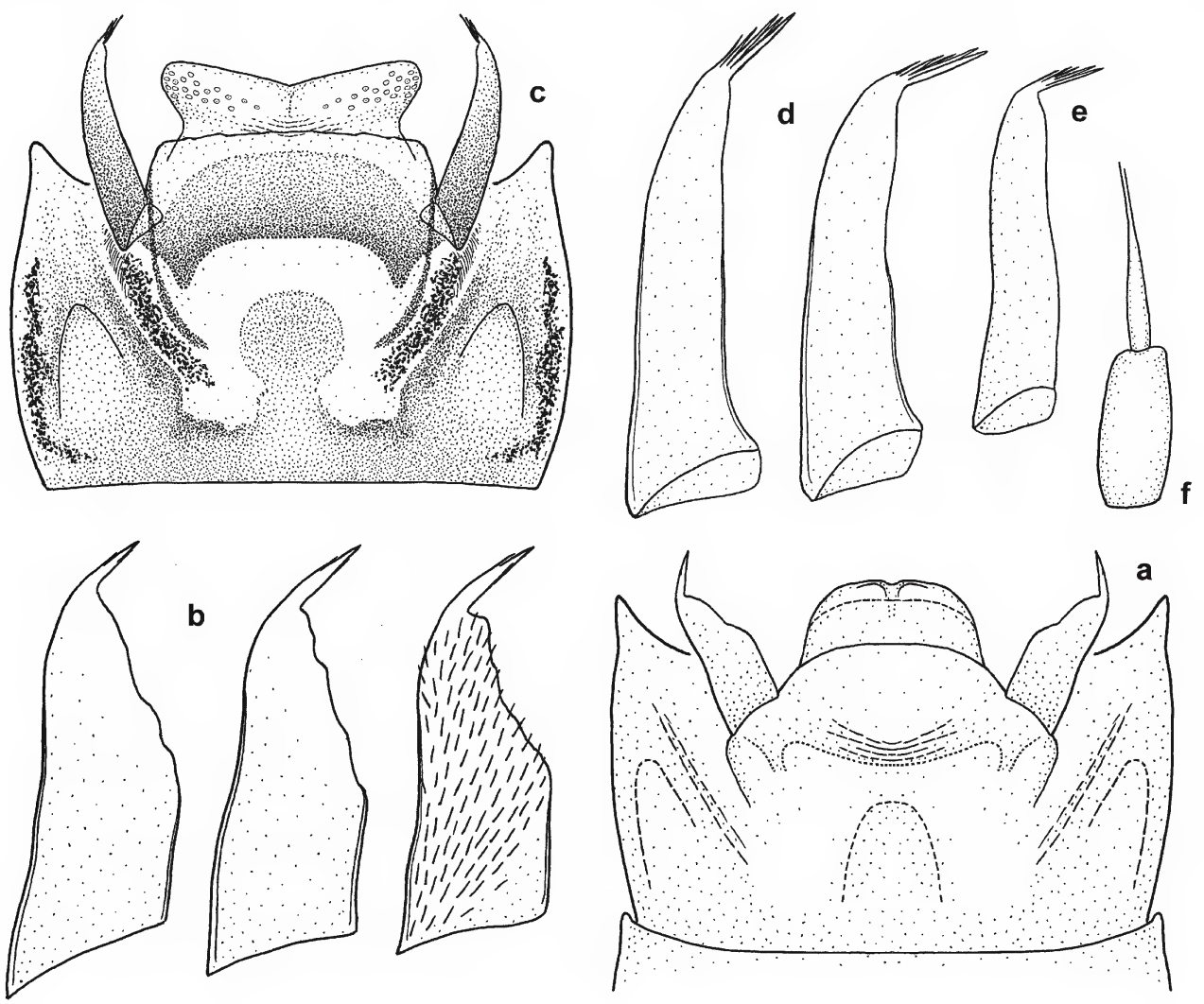


Fig. 5. *Caenis maratha* n. sp., ♂ (a–b), *C. annulata* ♂ (c–d) and *C. philippinensis*, ♂ (e–f). – **a**, **c**. Genitalia. **b**, **d**, **e**. Forcipes. **f**. Antennal pedicle and base of flagellum.

side covered with a fine lamella. Styliger sclerite narrow, elliptical, and with short apophyses. Basal half of forcipes very broad, apical part abruptly narrowed to the tip, with a long and strong apical spine, and a few thin bristles, often hardly visible (Fig. 5b).

Female imago and larva unknown.

Differential diagnosis

Caenis maratha n. sp. can be distinguished from all other *Caenis* species by the following combination of characters: Tarsomeres 2–4 of fore tarsus apically broadened; broadenings equipped with spines. Penis narrow, without bulging lobes, ventral side with a fine lamella. Styliger sclerite elliptical. Basal half of forcipes very broad, apical part abruptly narrowed, apically with a long spine.

Caenis guttata **n. sp.**
(Figs. 6a–c)

Holotype ♂ (on microslide): Thailand, riv. Kwai, 5.II.2006, J.-M. Elouard leg.

Etymology

The name of the new species refers to the speckled pigmentation of the body, from Latin 'guttatus' for speckled.

Description

Male imago

Measurements, ratios and colouration

Body length: 2.0 mm; wing length: 1.6 mm; length of fore leg: 1.5 mm. Ratio of fore femur : fore tibia = 0.71–0.75; ratio of fore tibia : fore tarsus = 1.16–1.18; ratio of fore leg : hind leg = 1.33–1.34; ratio of segments of fore tarsus $1^{st} : 2^{nd} : 3^{rd} : 4^{th} : 5^{th} = 1 : 1.8–1.9 : 1.4–1.5 : 1.7–1.8 : 1.3–1.5$.

Colouration of cuticle: Head and mesonotum intensely brown, pro- and metanotum a little lighter, legs and abdominal terga I–VII yellowish-white, abdominal terga VIII–X and base of antenna light brown.

Epidermal pigmentation forming an intense blackish pattern: Head, pedicle and mesonotum diffusely pigmented, head with a blackish-brown band on posterior margin. Mesonotal pigmentation more intense along sutures and on scutellum. Pronotum and abdominal terga VIII–X speckled with black. Abdominal terga I–VII with transverse pigment bands on hind margin and large paratergal spots or blotches, terga I and II with a median black line and sublateral longitudinal dashes. Pleura and large parts of the ventral side speckled with black. Abdominal sterna with a median longitudinal row of spots. Prosternal triangle strongly pigmented (Fig. 6c). Additionally to preapical black spots, all femora also with median dashes, fore femora additionally also with basal dashes.

Morphology

Head: Base of antennal flagellum not dilated.

Thorax: Prosternal triangle long and narrow, with slightly convex sides and rounded tip, strongly pigmented (Fig. 6c). Tarsomeres 2–4 of fore tarsus apically scarcely broadened and provided with just a few short spines. Tarsomere 2 only about 1.8 times the length of tarsomere 1. Tarsomeres 2–5 not very different in length: 2 about as long as 4, 3 about as long as 5.

Abdomen: Lateral filaments of abdominal segments short. Without finger-like process on tergum II.

Genitalia and sternum IX as in Fig. 6a. Penis not preserved. Styliger sclerite elongated, anterior margin distant from base of forcipes, with two narrow apophyses of moderate length. Forceps with a very long spine angled to the short and broad shaft. Spine about two-thirds as long as shaft. Surface of forceps equipped with long trichomes (Fig. 6b).

Female imago and larva unknown.

Differential diagnosis

Caenis guttata n. sp. can be distinguished from all other *Caenis* species by the following combination of characters: Forceps short and broad, with a very long apical spine, about two-thirds the length of forceps shaft. Styliger sclerite elongated, anterior margin far away from base of forcipes. Tarsomere 2 of fore leg only about 1.8 the length of tarsomere 1. Tarsomeres 2–5 of similar length. Dorsal and ventral side with an intense blackish pigment pattern.

Remarks

Only a single specimen is available from this species. Unfortunately the genitalia are partly damaged. The remaining characters however are so striking that a description of a new species seems to be justified.

Caenis gephyria **n. sp.**
(Figs. 6d–g)

Holotype ♂ (on microslide): Thailand, riv. Kwai, 5.II.2006, J.-M. Elouard leg.

Paratypes: Thailand, riv. Kwai, 7.II.2006, J.-M. Elouard leg., 4 ♂♂.

Etymology

The name of the species was chosen with reference to the famous bridge across the river Kwai. The latinized Greek term gephyrius means 'belonging to the bridge'.

Description

Male imago

Measurements, ratios and colouration

Body length: 1.9–2.1 mm; wing length: 1.5–1.7 mm; length of fore leg: 1.5–1.6 mm. Ratio of fore femur : fore tibia = 0.40–0.46; ratio of fore tibia : fore tarsus = 1.39–1.48; ratio of fore leg : hind leg = 1.98–2.01; ratio of segments of fore tarsus 1^{st} : 2^{nd} : 3^{rd} : 4^{th} : 5^{th} = 1 : 4.1–4.2 : 2.5–2.6 : 1.8–1.9 : 1.4–1.5; ratio of body length : length of cercus : length of terminal filament = 1 : 2.5 : 3.5; ratio terminal filum : cercus = 1.4.

Colouration of cuticle: Mesonotum yellowish-brown. Head and metanotum a little lighter. Pronotum anteriorly and sublaterally light yellowish-brown. Antennae and legs weakly tinted.

Epidermal pigmentation: No pigments present.

Morphology

Head: Fore margin between lateral and frontal ocelli slightly bowed. Base of antennal flagellum not dilated.

Thorax: Mesonotum broad. Outlines of prosternal triangle vague, without clear lateral ridges (Fig. 6g). Tarsomeres 2–4 of fore tarsus apically a little more broadened as in *C. guttata*, but not as broad as in *C. nigropunctatula* or *C. ranauensis*.

Abdomen: Lateral filaments of abdominal segments short triangular. Without finger-like process on tergum II.

Genitalia and sternum IX as in Figs. 6d, e. Penis apically narrow (width about 0.5 the distance of the extreme lateral points of the forceps bases, see key to males), basally strongly broadened, lobes short and rounded. Styliger sclerite broad with short apophyses. Posterior margin of central sclerite strongly sclerotized and serrated. Forcipes short and broad, with a thin, relatively long spine. Anterolateral process of segment IX long (Fig. 6f).

Female imago and larva unknown.

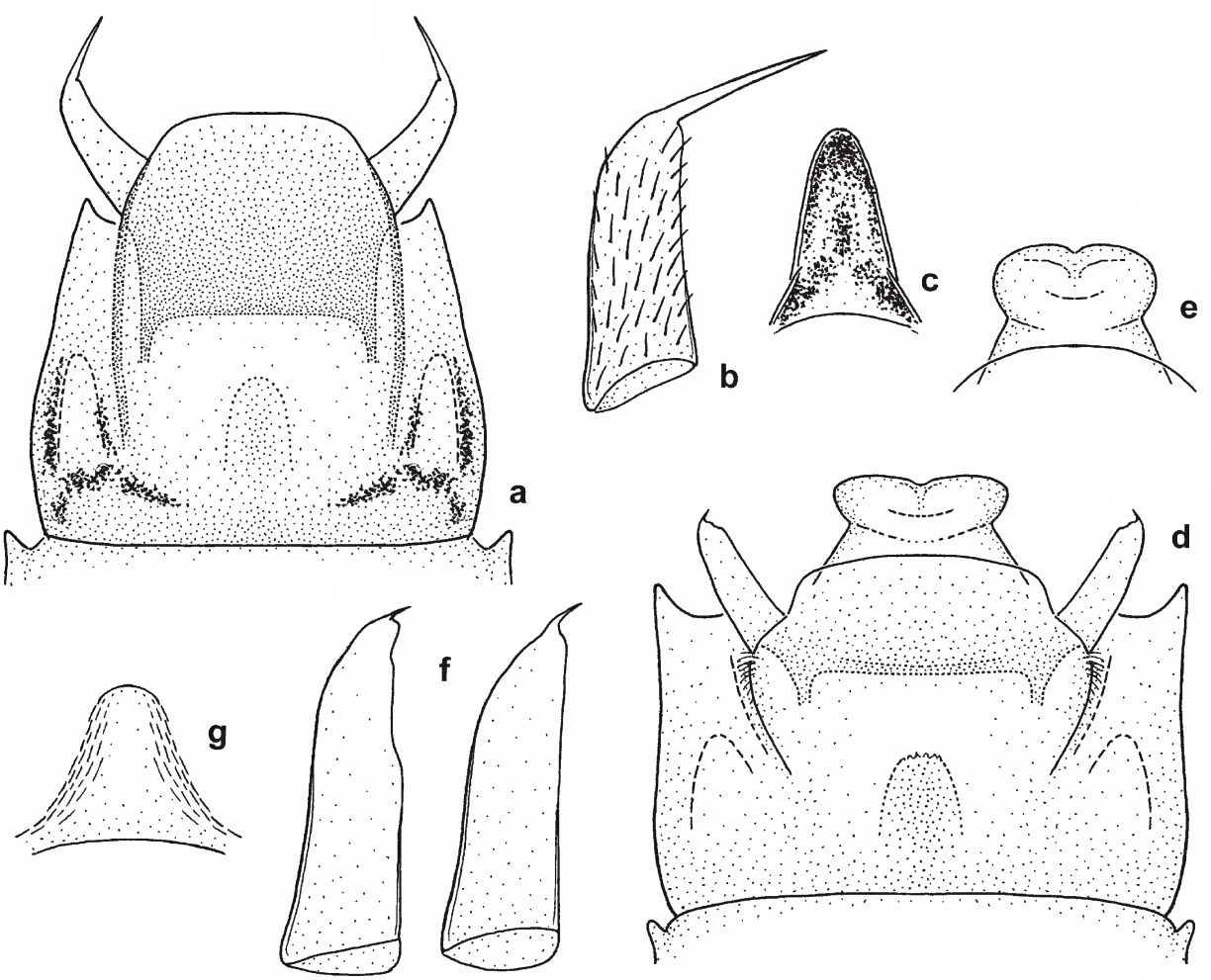


Fig. 6. *Caenis guttata* n. sp., ♂ (a–c), *C. gephyria* n. sp., ♂ (d–g). – **a**, **d**, **e**. Genitalia. **b**, **f**. Forcipes. **c**, **g**. Prosternal trangle.

Differential diagnosis

Caenis gephyria can be distinguished from all other species of *Caenis* by the following combination of characters: Forceps short and broad, with a single thin apical spine. Outlines of prosternal triangle vague, without clear lateral ridges. Tarsomeres 2–4 of fore tarsus apically slightly broadened and equipped with spines. Penis narrow, with short rounded lobes. Antennal flagellum not dilated.

Caenis picea Kimmins, 1947
(Figs. 7a–c)

Kimmins (1947: 99).

Material examined

Holotype ♂: India, Calcutta, Baranagar-Kamarhati, 29.XII.1945, D. E. Kimmins leg. – Paratypes: same data as holotype, 6♂♂, 2♀♀. – Other material: Thailand, riv. Kwai, 5.II.2006, J.-M. Elouard, 6♂♂. – Thailand, riv. Kwai, 7.II.2006, J.-M. Elouard, 20♂♂.

Redescription

Male imago

Measurements, ratios and colouration

Body length: 2.4–2.6 mm; wing length: 2.0–2.1 mm; length of fore leg: 2.1 mm. Ratio of fore femur : fore tibia = 0.49–0.53; ratio of fore tibia : fore tarsus = 1.35–1.52; ratio of fore leg : hind leg = 1.84–2.10; ratio of segments of fore tarsus $1^{st} : 2^{nd} : 3^{rd} : 4^{th} : 5^{th} = 1 : 3.1–4.0 : 1.7–2.1 : 1.3–1.7 : 1.1–1.4$; ratio of body length : length of cercus : length of terminal filament = 1 : 2.8 : 3.8; ratio terminal filum : cercus = 1.35.

Colouration of cuticle: Meso- and metanotum yellowish-brown, head and pronotum a little lighter. Other parts yellowish-white or white.

Epidermal pigmentation: Head grey with a lighter transverse band on vertex; anterior part of the latter often with six longitudinal black lines. Pronotum grey with two paramedian blackish spots and two lateral marks on each side. Prealar bridges and pleura grey with blackish sutures. Mesonotum greyish shaded, particularly behind transverse interscutal sutures and scutellum. Abdominal terga III–VI blackish, terga before and behind light. Tergum IX often with a medio-longitudinal black dash. Paratergal spots and dashes intense.

Morphology

Head: Vertex domed, frons strongly sloping. Base of antennal flagellum not dilated.

Thorax: Sides of prosternal triangle weakly concave or S-shaped, tip more or less broadly rounded (like in Fig. 3i) or cut, without transverse strip. Tarsomeres 2–4 of fore tarsus apically only slightly broadened; broadenings equipped with small strong spines.

Abdomen: Lateral filaments of abdominal segments short. Tergum II with a short cone or finger-like process.

Genitalia and sternum IX as in Figs. 7a, b. Penis lobes broadly rounded, hind margin of each half more or less convex. Penis ventrally with a broadly V- or heart-shaped brown sclerite, variable (Fig. 7b right half from Thailand). Styliger sclerite with apophyses of moderate length. Central sclerite elongated oval. Forceps broad, apically with a few short bristles, hardly longer than bristles from the surface, sometimes more or less fused together (Thailand, Fig. 7c). Styliger sclerite, central sclerite, and basolateral parts of tergite IX brown.

Female imago

Besides the male paratypes also two females were designated as paratypes, but these cannot be assigned to the males with certainty.

Larva unknown.

Remarks

Caenis picea is similar to the Palearctic species *Caenis lactea*, both with domed vertex, very similar genitalia and the characteristic pigmentation of abdominal terga. They can be distinguished by body size (*C. picea* 2.5 mm, *C. lactea* 4.0 mm), fore leg tarsomeres 2–4 (apically broadened and equipped with strong spines in *C. picea*, without those spines in *C. lactea*, borders between segments oblique in lateral view) and shape of forcipes that are medially more or less fitted at the waist in *C. lactea*.

Caenis incurva **n. sp.**
(Figs. 7d–f)

Holotype ♂: India, Calcutta, Baranagar-Kamarhati, 29.XII.1945, D. E. Kimmins leg.

Etymology

The species epithet refers to the strongly bowed apophyses of the stylger sclerite.

Description

Measurements, ratios and colouration

Body length: 2.8–2.9 mm; wing length: 2.6 mm; length of fore leg: 2.5 mm. Ratio of fore femur : fore tibia = 0.78; ratio of fore tibia : fore tarsus = 1.16; ratio of fore leg : hind leg = 1.52; ratio of segments of fore tarsus $1^{st} : 2^{nd} : 3^{rd} : 4^{th} : 5^{th} = 1 : 3.2 : 2.0 : 1.7 : 1.3$; ratio of body length : length of cercus : length of terminal filament = 1 : ± 1.4–1.5 : ± 1.7; ratio terminal filum : cercus = 1.33–139.

Colouration of the specimen is not preserved.

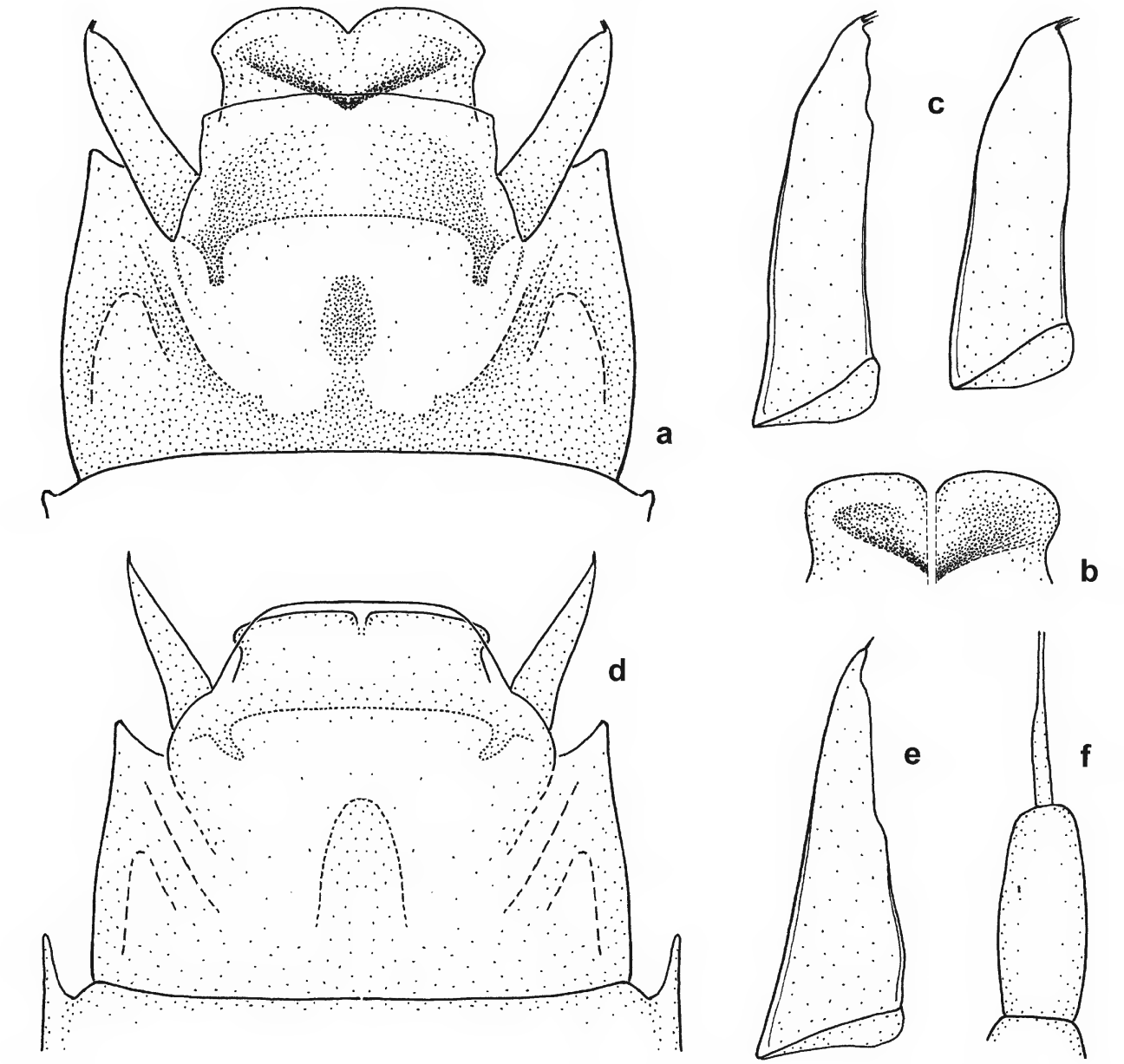


Fig. 7. *Caenis picea* Kimmins, ♂ (a–c), *C. incurva* n. sp., ♂ (d–f). – **a**, **b**, **d**. Genitalia. **c**, **e**. Forcipes. **f**. Antennal pedicle and base of flagellum.

Morphology

Head: Base of antennal flagellum slightly dilated, dilated part half as long as pedicle (Fig. 7f).

Thorax: Prosternal triangle equilateral, sides clearly concave. Tarsomeres 2–4 of fore tarsus apically clearly broadened; broadenings equipped with small strong spines (intermediate between Figs. 1k, l and 3j, k).

Abdomen: Lateral filaments of abdominal segments of moderate length.

Genitalia and sternum IX as in Fig. 7d. Penis short, broad, and stocky, covered by styliger plate, lobes short and rounded. Styliger sclerite with apophyses strongly bent medially. Sides of forceps evenly converging, lateral side weakly S-shaped, tip with a short thin spine (Fig. 7e).

Differential diagnosis

Caenis incurva can be distinguished from all other *Caenis* species by the following combination of charac-

ters: Tarsomeres 2–4 of fore tarsus apically clearly broadened and equipped with small strong spines. Penis with very short lobes, covered by the styliger plate. Apophyses of styliger sclerite strongly bent medially. Sides of forceps evenly converging, tip with a short thin spine.

Remarks

Among the paratype specimens of *Caenis picea* I found a single specimen of another species, as described above. First I took it for a specimen of *Caenis piscina*, also described from the surroundings of Calcutta. However, a further examination of all (dried) type specimens of the latter species showed significant differences, so this specimen is attributed to a new species.

Caenis piscina Kimmins, 1947

Kimmins (1947: 99).

Material examined

Holotype ♂ (dried): India, Calcutta, X.1945, D. E. Kimmins leg. – Paratypes: same data as holotype, 4 ♂♂, 1♀.

All type specimens are preserved in dried condition. Genitalia are strongly deformed, even the shape of the relatively short forcipes cannot be observed. Fore legs are lacking, preserved legs without tarsi. As these missing body parts bear important taxonomic characters, a redescription on the basis of modern diagnostic characters and a comparison with the herein described species is impossible. The epidermal pigmentation however (abdomen figured by Kimmins 1947) may help to identify the species at a later time when fresh material from the locus typicus or adjacent regions will be available.

Epidermal pigmentation: Head greyish. Pronotum with grey marks and dashes. Pleura, particularly prealar bridges, and coxae with grey to blackish spots and dashes. Hind part of mesonotum shaded with grey. Scutellum grey, sutures darker. Abdominal terga with a pigment pattern as shown in Kimmins 1947: fig. 13 (in males the pigmentation often reduced and lighter). Paratergal spots and dashes intense. Mid and hind femora with preapical blackish spots.

Caenis perpusilla Walker, 1853

Walker (1853: 585); Eaton (1884: 148); Needham (1909: 191); Kimmins (1960: 305).

Material examined

Holotype ♂ (dried): Sri Lanka (detailed locality not mentioned on label).

The single type specimen I received for investigation from the BMNH is preserved in dried condition. The treatment with lactic acid and a transfer into 70 % ethanol did not lead to an improved condition. Because of the strong deformation nearly no diagnostic features can be observed or reliably interpreted. Both fore legs that bear important diagnostic characters are broken off and are lacking. Under these circumstances a redescription on the base of modern diagnostic characters and a comparison with the here described species is impossible. *Caenis perpusilla* is therefore declared as 'species inquirenda'. Already Eaton (1884) stated that "an adequate description of the species" based on the dried type specimen is impossible, "and therefore the name may rank as a mere catalogue name".

Caenis annulata Navás, 1923
(Figs. 5c, d)

Navás (1923: 1).

Material examined

Syntypes: 4♂♂, Philippines, Vigan, 1917, F. Mas leg.

The type specimens are preserved in dried condition. Therefore only the following characters can be studied:

Measurements and colouration

Body length: 2.4–2.5 mm; wing length: 3.0–3.2 mm; length of fore leg: 2.5 mm.

Colouration of cuticle: Mesonotum and tergum X dark brown, head and pronotum a little lighter, abdominal terga brownish. Edges of femora dark brown.

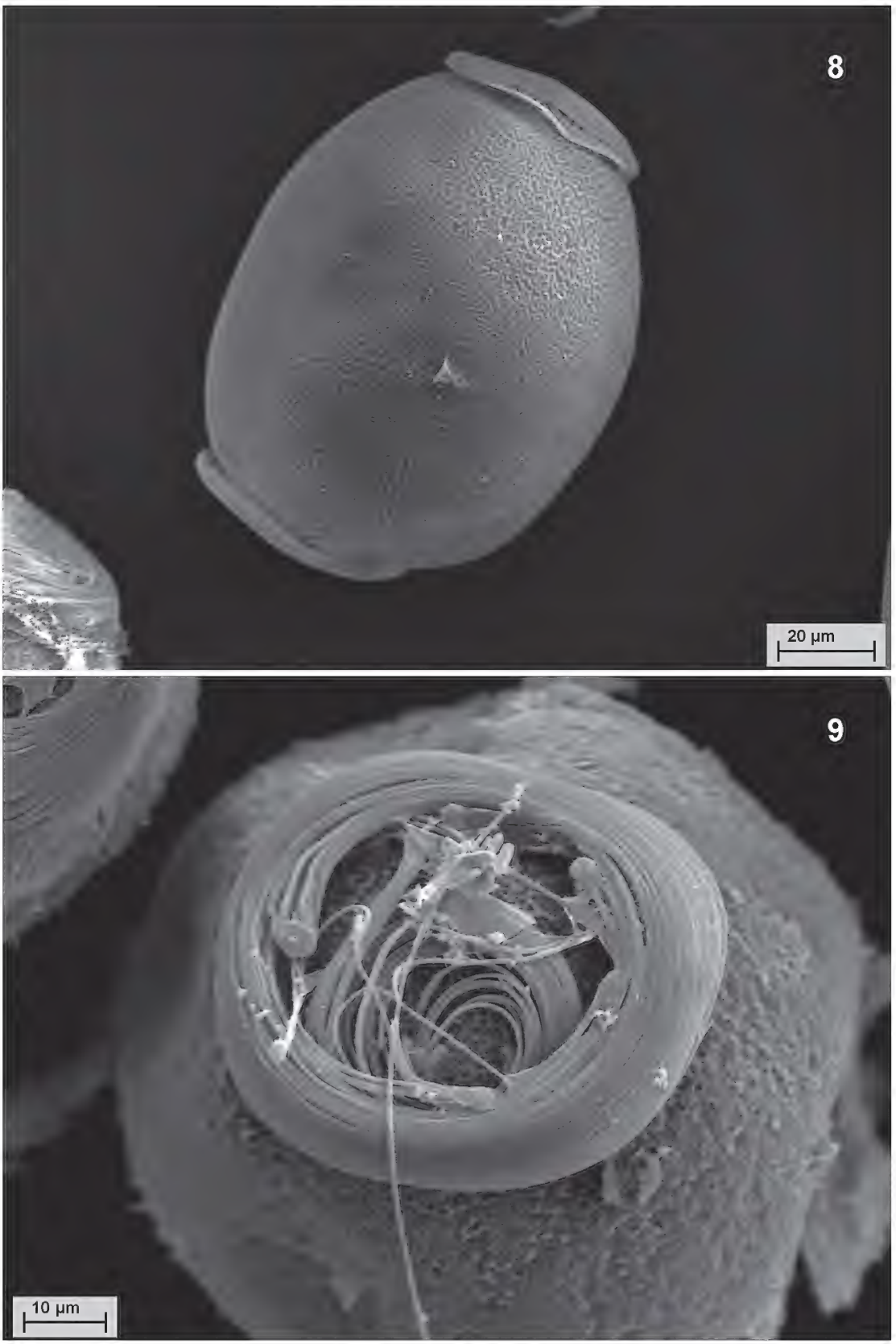
Epidermal pigmentation: Head and pronotum with blackish pigment-pattern. Abdominal terga I–VI with broad strongly pigmented transverse bands, terga VII and VIII with sublateral oblique marks.

Genitalia and sternum IX as in Fig. 5c. Penis lobes short, broadly triangular, with a field of small round sensillae. Styliger sclerite with broad apophyses of moderate length. Lateral sclerites long and very narrow, fibula-shaped. Central sclerite circular. Forcipes slightly bowed, with an apical tuft of long spines (Fig. 5d). Genital sclerites, forcipes, and basolateral parts of sternum IX brown. Blackish pigments between lateral and basolateral sclerites and along the lateral margin.

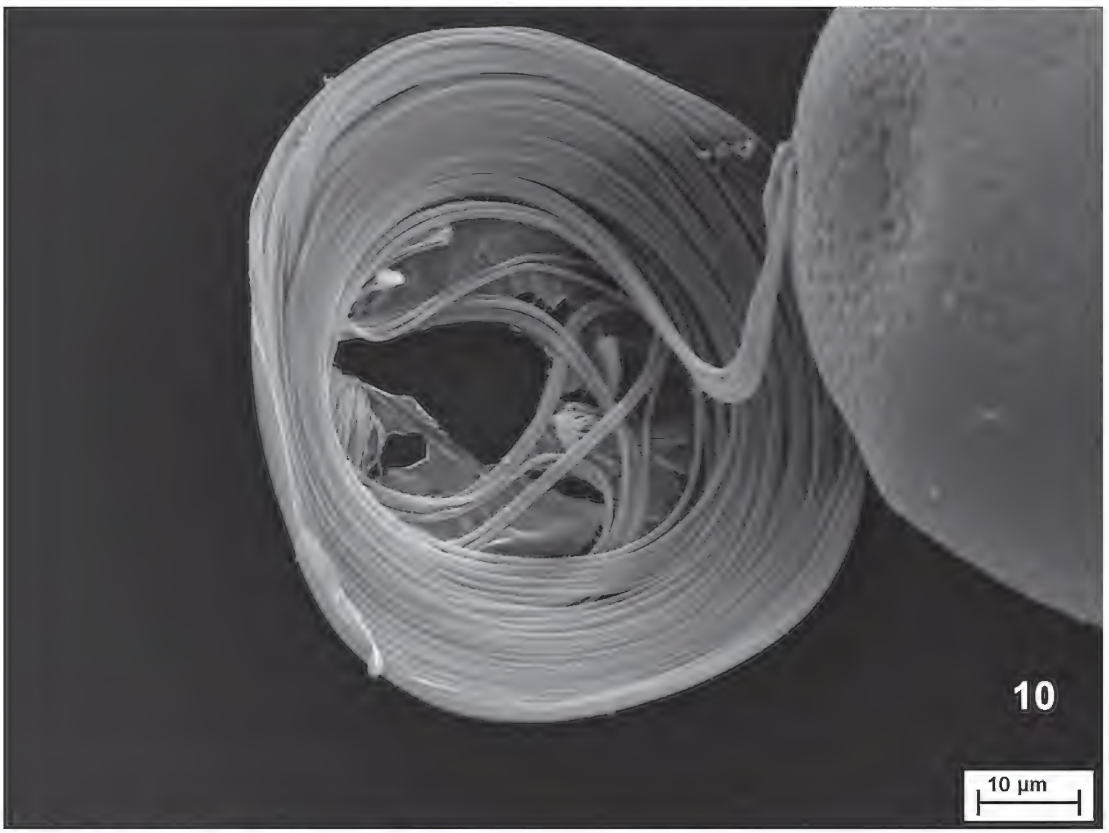
For a complete redescription of the species new material from the locus typicus (northern part of Luzon) would be necessary. Genital characters, however, are sufficient for the admission into the key to males (section 4).

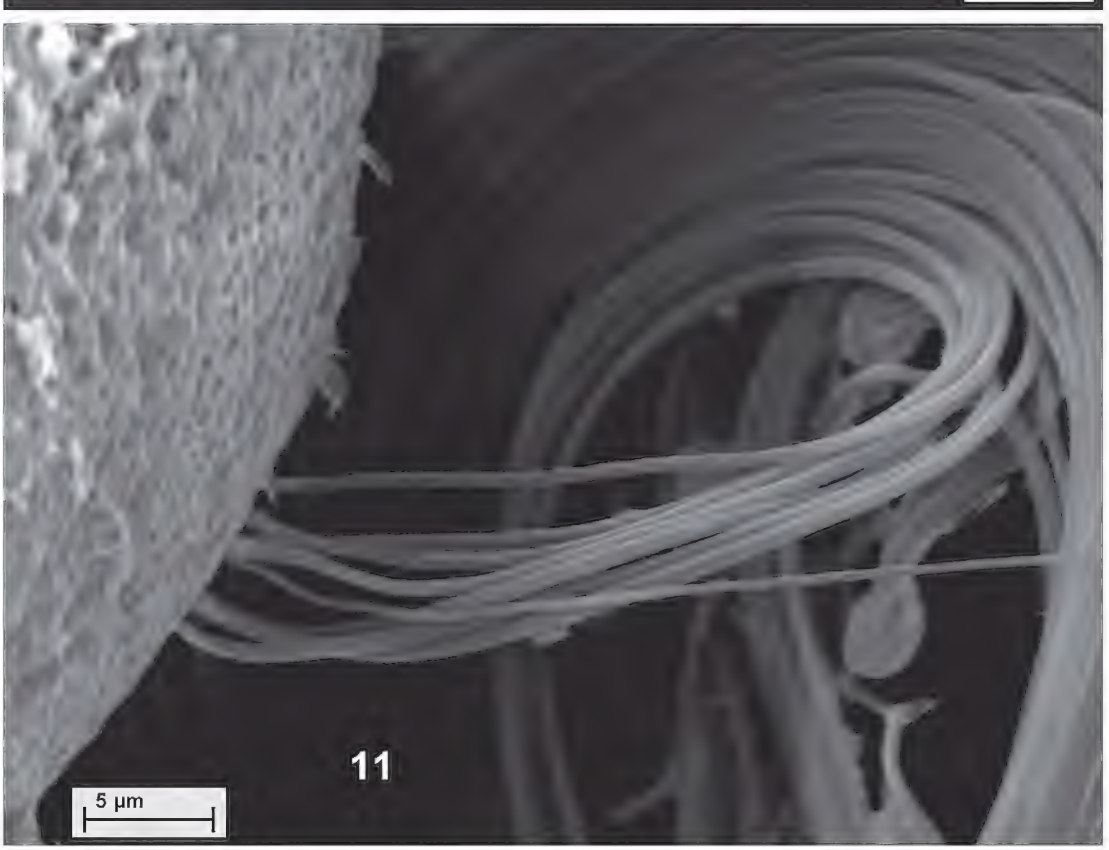
Differential diagnosis

Caenis annulata can be distinguished from all other *Caenis* species of the Oriental Region by the following combination of characters: Penis lobes triangular, with a

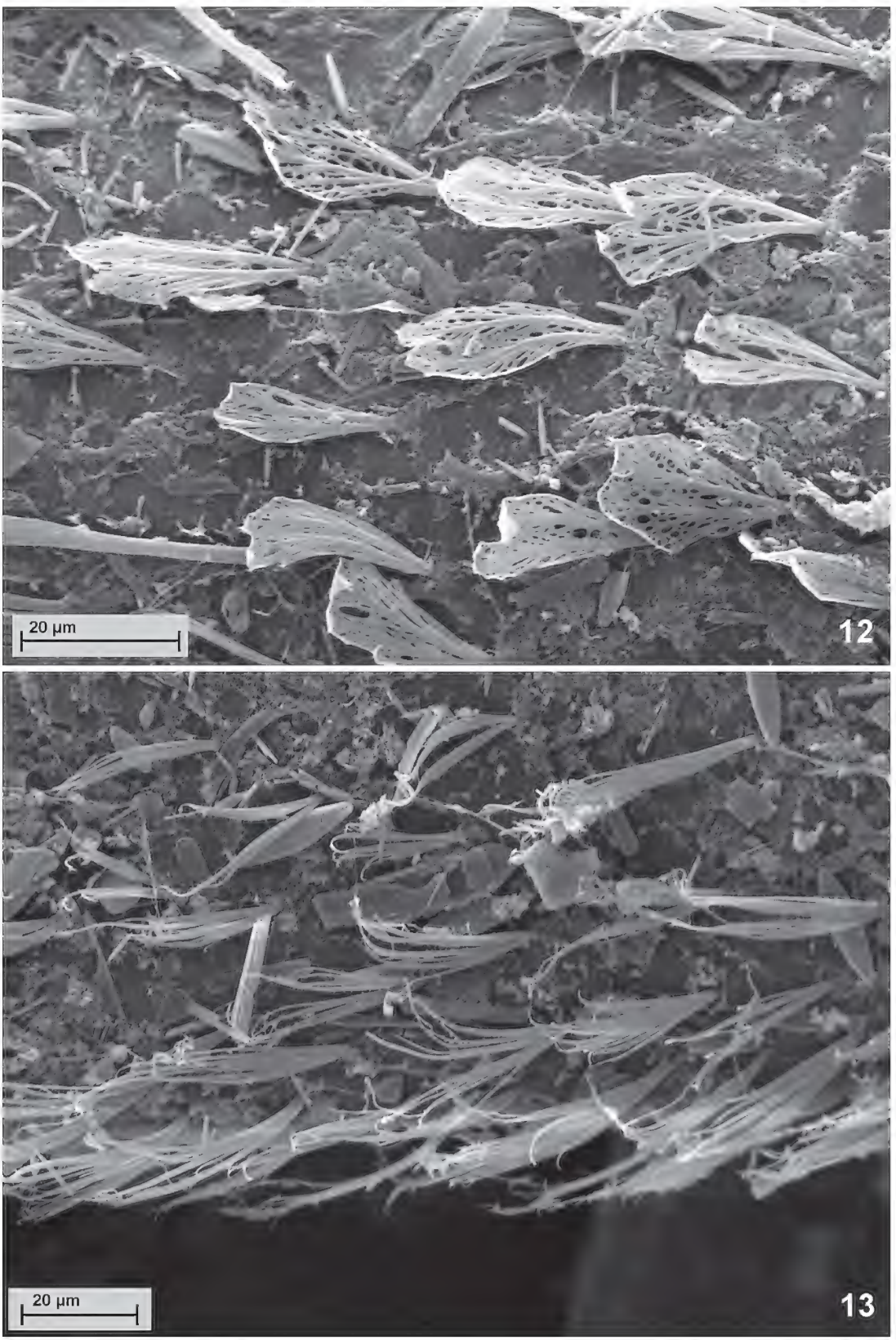


Figs. 8–9. *Caenis nigropunctatula* n. sp. – **8**. Egg. **9**. Egg, epithema.

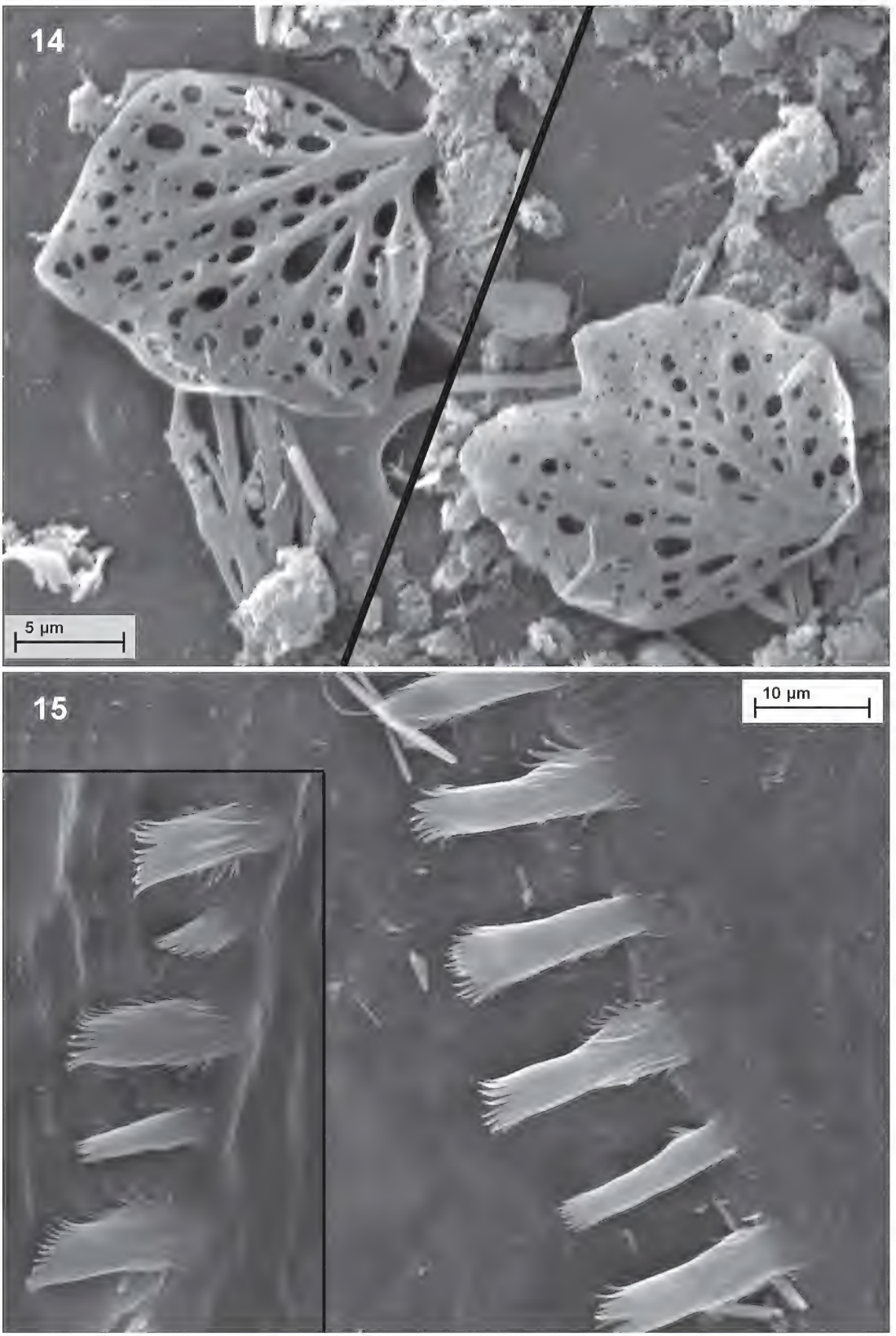




Figs. 10–11. *Caenis nigropunctatula* n. sp., egg. – **10**. Epithema, inner side. **11**. Epithema, insertion of threads.



Figs. 12–13. *Caenis nigropunctatula* n. sp., larva. – **12**. Tongue-shaped bristles from hind femur. **13**. Branched bristles from margin of mid femur.



Figs. 14–15. *Caenis nigropunctatula* n. sp., larva. – **14**. Shield-shaped bristles of mesonotum. **15**. Operculate gill, microtrichia from the row on ventral side (small frame: from the end of the row).

field of small round sensillae. Genital sclerites, forcipes, and basolateral parts of sternum IX strongly brown. Lateral sclerites long and fibula-shaped. Central sclerite circular. Forcipes with an apical tuft of long spines.

Caenis pumila Navás 1923

Navás (1923: 1).

Material examined
Holotype ♂ (dried): Philippines, Vigan, 1918, F. Mas leg.

In the compilation of types described by Navás (see Alba-Tercedor & Peters 1985) the authors state: "Type very damaged and without head". Additionally it has to be stated that its genitalia are deformed and lack forcipes. *Caenis pumila* therefore can not be identified and is hereby regarded as 'species inquirenda'.

Caenis philippinensis Ulmer, 1924
(Figs. 5e, f)

Ulmer (1924: 48, sub *Caenodes philippinensis*)

Material examined
Syntypes: 16 ♂♂, Philippines, Bilaran, 21.X.1915, Boettger leg.

Obviously the type specimens had been in dried condition, but at some point they were transferred into 75 % ethanol. Of all diagnostic characters, only the shape of antennal base and of forceps can be recognized. The base of the antennal flagellum is dilated (Fig. 5f) and the forceps tip is provided with a tuft of long spines (Fig. 5e).

About 30 species of *Caenis* show this combination of characters, and *Caenis philippinensis* has to be assigned to this group. However, a redescription of the species is only possible once new material from the locus typicus (southern part of Luzon) will become available.

Caenis nigrostriata Navás, 1932

Navás (1932: 20).

Material examined
Holotype ♀ (dried): India, Bandra, Mumbay, 20.IX.1929.

This species is only known from its holotype, a heavily damaged female preserved in dry condition. *Caenis nigrostriata* is therefore regarded as 'species inquirenda'.

Caenis demoulini van Bruggen, 1954

Van Bruggen (1954: 11).

I have not seen the types, deposited in the Rijksmuseum van Natuurlijke Historie, Leiden. However, because all type specimens are females, it is impossible to determine and identify them by morphological methods. *Caenis demoulini* therefore is declared as 'species inquirenda'.

4 Key to males of Oriental *Caenis*

1 Tarsomeres 2–3 of fore tarsus each with one apico-median projection (Malzacher 2013: fig. 1f). **2**
– Tarsomeres 2–4 of fore tarsus apically with a lateral and a median projection or broadening, or only slightly broadened (Figs. 1k, l, 4i, j). **4**
2 Forceps very long, slender and pointed. Penis rectangular, shaft of penis laterally inflated (Malzacher 2013: figs. 3a, b). ..... ***C. fregatula***
– Forceps with apical tuft of spines (Malzacher 2013: figs. 1b, 2c). Penis differently shaped. **3**
3 Forceps long (length to basal width about 7 : 1), slightly curved laterally (Malzacher 2013: fig. 1b). Styliger sclerite without apophyses. ..... ***C. unidigitata***
– Forceps shorter (length to basal width about 5 : 1), straight or slightly bent medially (Malzacher 2013: fig. 2c). Styliger sclerite with thin apophyses. ..... ***C. sebastiani***
4 Forceps with a very long spine angled to the short and broad shaft. Ratio length of shaft to length of spine about 1.5 (Fig. 6b). Styliger sclerite elongated, anterior margin far away from the base of forcipes (Fig. 6a). Segment II of fore tarsus about 1.8 times the length of segment I. ..... ***C. guttata***
– Forceps with clearly shorter apical spines or bristles or without any. Anterior margin of styliger sclerite more or less on the same line with forceps bases. Segment II of fore tarsus more than 3 times the length of segment I. **5**
5 Apophyses of styliger sclerite curved medially (Fig. 7d). Sides of forceps evenly converging, ending apically in a short thin spine (Fig. 7e). Lateral abdominal filaments of moderate length. ..... ***C. incurva***
– Apophyses of styliger sclerite straight or lacking. Sides of forceps not evenly converging. Lateral abdominal filaments short or very short. **6**
6 Forceps apically with a tuft of long spines or with a long strong spine and a few thin bristles more or less fused. **7**
– Forceps with short bristles, a short spine or a more or less rounded tip. **9**
7 Genital sclerites and forceps brown. Central sclerite large and round (Fig. 5c). Forceps with a tuft of long spines (Fig. 5d). ..... ***C. annulata***
– Genital sclerites and forceps not or only weakly coloured. Forceps apically with a long strong spine or a few thin bristles more or less fused. **8**
8 Sides of forceps parallel or more or less apically converging (Figs. 4c–f). Penis with lobes laterally slightly protruding and a tongue-shaped ventral lamella (Fig. 4a). Tarsomeres 2–4 of fore tarsus with tongue-shaped projections (Fig. 4j). ..... ***C. ulmeriana***
– Basal half of forceps very broad, with parallel sides, apical part abruptly narrowed to the tip (Fig. 5b). Penis narrow, semicircular, lobes laterally not protruding, ventral side of penis covered by a broad lamella (Fig. 5a). Tarsomeres 2–4 of fore tarsus apically broadened; broadenings equipped with small strong spines. ..... ***C. maratha***

9 Penis anvil-shaped, hind margin straight with two narrow transverse sclerites. Forceps long and narrow, slightly bent medially. Tarsomere 2 of fore tarsus 1.5 times as long as tarsomeres 3–5 together. – Styliger sclerite without apophyses (Malzacher 2013: figs. 4a, b f). ..... ***C. bidigitata***

– Penis and forceps differently shaped. Tarsomere 2 of fore tarsus shorter. **10**

10 Forceps long, with more or less parallel sides, slightly bent laterally, with a short broad spine inserting medially. – Prosternal ridges straight, forming a broad trapezoid (Malzacher 2013: figs. 6a–d)..... ***C. abdita***

– Forceps sides converging and/or forceps short..... **11**

11 Small species, body length at most 2.1 mm, wing length at most 1.7 mm, fore leg length at last 1.6 mm. Outlines of prosternal triangle vague, without clear lateral ridges (Fig. 6g). Forceps short and broad (Fig. 6f). Apical width of penis about 0.5 the distance of the extreme lateral points of the forceps bases (Fig. 6d). ..... ***C. gephyria***

– Body longer than 2.4 mm, wing longer than 2.0 mm, fore leg longer than 2.1 mm. Prosternal triangle with clear lateral ridges. Apical width of penis about 0.7 and more the distance of the extreme lateral points of the forceps bases. **12**

12 Tip of forceps rounded, very different shapes (Figs. 3c–g). Prosternal ridges apically forming a broadly rounded triangle with straight or slightly convex sides (Fig. 3i)..... ***C. ranauensis***

– Forceps apically with a short spine or a few short bristles. Prosternal triangle with more or less rounded tip, sides concave or S-shaped..... **13**

13 Penis ventrally with a large V- or heart-shaped brown sclerite (Figs. 7a, b). Forceps long and voluminous, apically with a few short or very short bristles often fused together (Fig. 7c). Genital sclerites more or less brownish. Abdominal tergum II with a short finger-like process. ..... ***C. picea***

– Penis broad, without V-shaped sclerite (Figs. 1a, b). Forceps small, apically with a short spine (Figs. 1c–i). Genital sclerites uncoloured, often hardly visible. Abdominal tergum II without finger-like process ..... ***C. nigropunctatula***

5 Conclusions

The types of five Oriental species of *Caenis* are in bad condition or represented only by females. Therefore they cannot be redescribed on the base of modern diagnostic characters and a comparison with valid species of the region is impossible. *Caenis perpusilla*, *C. nigropunctata*, *C. pumila*, *C. nigrostriata*, and *C. demoulini* are therefore regarded as 'species inquirenda'. The material from the coll. G. Ulmer determined by Ulmer himself as *Caenis nigropunctata* could be sorted into three new species, namely *C. nigropunctatula*, *C. ranauensis*, and *C. ulmeriana*. Three further new species described from specimens that I received from M. T. Gillies and M. Sartori are *Caenis maratha* from India, and *C. guttata* and *C. gephyria* both from Thailand. *Caenis annulata* and *C. picea* could be redescribed. A paratype of *Caenis picea* was removed and described as the new species *C. incurva*. Together with five species from Borneo (Malzacher 2013), altogether 14 species are now described on the base of modern diagnostic criteria and a key is provided for these species. *Caenis pycnacantha* (see Jia et al. 2010) from which no material was available to me can be assigned to a species-group with dilated base of antennal flagellum and an apical tuft of spines on forceps. However, for integration into the key of males, some other details e. g. the structure of fore tarsus would be necessary. The same applies to *Caenis philippinensis*. Unfortunately I could not get the type of *Caenis srinagari*, described by Traver (1939), from Northern India, deposited in the Purdue Entomological Research Collection, West Lafayette. However, it is quite possible that the latter species belongs to the Palearctic region. *Caenis kimminsis* and *C. dangi*, described by Ali (1967) and Soldán (1986), and the species described by Kang & Yang (1994, 1996) and Tong & Dudgeon (2002) are known only from larvae. A conspecifity of these species with species only known as imago cannot be ruled out.

Five species from China not mentioned above were recorded by Zhou & Zheng (2004): *Caenis parviforcipis* Zhou & Zheng, 2004, *C. sinensis* Zhou & Zheng, 2004, *C. nigropunctata*, *C. rivulorum* Eaton, 1884 and *C. melanoleuca* Zhou & Zheng, 2004. Based on the figures of genitalia and partly also antenna three of them have to be assigned to the Palearctic fauna because they are closely related to species of this bioregion: *Caenis rivulorum* (a Palearctic species at all), *C. parviforcipis* (close to *C. robusta* Eaton, 1884) and *C. sinensis* (close to *C. horaria* Linnaeus, 1758). This seems to be an introgression of Palearctic species into the Oriental Region (compare Barber-James et. al. 2008). The species determined as *Caenis nigropunctata* in Zhou & Zheng (2004) is not identical with one of the herein described species. Characters that can be taken from two drawings and the very short description are: base of antennal flagellum strongly dilated, forceps with an apical tuft of spines and penis lobes rounded. That is not sufficient for the description of a new species. From the shape of the forcipes *Caenis melanoleuca* could also belong to the Palearctic fauna, but Zhou & Zheng mentioned that in some specimens the forcipes are contracted and nearly totally covered by the styliger plate. This means that they are probably provided with well developed forceps muscles. Hence this species cannot belong to the genus *Caenis* which does not have those strong muscles.

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Parymenopus davisoni Wood-Mason synonym of *Helvia cardinalis* Stål (Insecta: Mantodea: Hymenopodidae)

Christian J. Schwarz

Abstract

After a brief outline of their taxonomic history, *Parymenopus davisoni* Wood-Mason, 1890 (Hymenopodidae, Hymenopodini) is revealed to be a junior synonym of *Helvia cardinalis* Stål, 1877.

Keywords: *Helvia*, *Parymenopus*, new synonymy, Sunda Archipelago

Zusammenfassung

Nach einem kurzen Abriss der taxonomischen Historie wird dargelegt, dass *Parymenopus davisoni* Wood-Mason, 1890 (Hymenopodidae, Hymenopodini) ein jüngeres Synonym von *Helvia cardinalis* Stål, 1877 ist.

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1 Introduction

The so-called "flower mantids" of the tribus Hymenopodini are rather colorful, medium-sized mantodeans characterized, among others, by a relatively short prothorax, lobed abdomen and walking legs at least in females, a keeled clypeus, and a short process on the vertex (Beier 1934, 1964, Wieland 2013). Many species also feature conical eyes which may or may not end in a small tubercle. They are also known for the possession of a second hearing organ on the mesothorax (Yager 1996). However, this feature is not restricted to this tribus but also found in other hymenopodids (Yager & Svenson 2008). Recent molecular studies have revealed the group to be polyphyletic, as some of the Afrotropical members previously assigned to it belong to a different lineage (Yager & Svenson 2008, Svenson & Whiting 2009).

The Oriental members form a well-defined and putative monophyletic group, though, represented by *Hymenopus* Audinet-Serville, 1831, *Creobroter* Audinet-Serville, 1839, *Helvia* Stål, 1877, *Parymenopus* Wood-Mason, 1890, and *Theopropus* Saussure, 1898 (Ehrmann 2002). While *Hymenopus*, *Parymenopus*, and *Helvia* are monotypic, *Theopropus* and particularly the speciose and widespread genus *Creobroter* are clearly in need of revision (Schwarz & Konopik 2014).

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Acronyms

CSC	author's collection
MNHN	Muséum National d'Histoire Naturelle, Paris
NRM	Naturhistoriska Riksmuseet, Stockholm
SMNK	Staatliches Museum für Naturkunde Karlsruhe

2 Establishing the synonymy

While working on the taxonomy and biogeography of the praying mantids of Borneo (Schwarz & Konopik 2014), it became obvious through institutional visits and literature surveys that the above-mentioned genera are rather widespread on the Sunda Archipelago, and even many species ranges span over more than one island or peninsula. It was only *Helvia* Stål, 1877, with *cardinalis* as its only species created at that occasion, which seemed to be restricted to the Malay Peninsula ("Malacca" in Stål 1877). The genus and species is described after a male in Latin on pages 86 and 87, with no illustration given. It remains up to date the only recorded specimen of this taxon. However, like most of Stål's types housed in the NRM, it was figured by Sjöstedt (1930, pl. 15, fig. 6) in his catalogue of mantodean type specimens deposited in that institution. Even though in black and white and at low resolution, the figure shows some important features

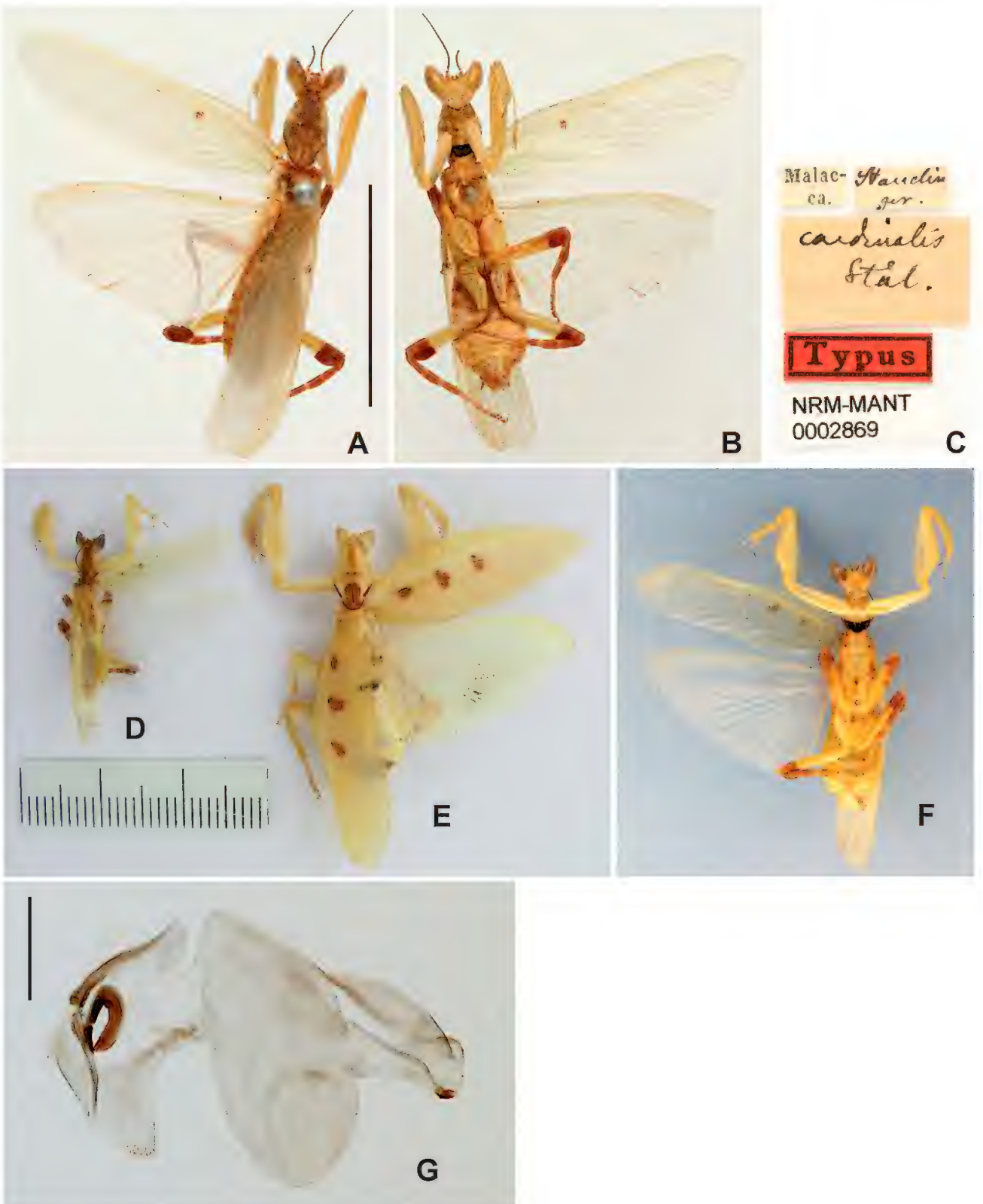

Fig. 1. *Helvia cardinalis*, holotype, NRM (A–C), Malay Peninsula, Cameron Highlands, SMNK (D–F), Malay Peninsula, Merapoh, CSC (G). – **A**. Dorsal view. **B**. Ventral view. **C**. Labels. **D**. ♂, dorsal view. **E**. ♀, dorsal view. **F**. ♂, ventral view. **G**. ♂ genitalia (preparation SCHWARZ no. 150). – Scales: 30 mm (D, E), 10 mm (A, B), 1 mm (G). – Photos: G. LINDBERG, © NRM (A–C), R. EHRMANN, © SMNK (D–F), author (G).

which are also present in the males of *Parymenopus davisoni* Wood-Mason, 1890, like the shape of head and pronotum, the pale tegmina, and the conspicuously annulated mid and hind legs.

P. davisoni was described in detail after a female from "Singapore" (Wood-Mason 1890, pp. 437–439). The accompanying plate XVIIA illustrates head and pronotum in dorsal view, head in anterior view, and a mid leg in posterior view. This species is very similar to its putative sister-species, the well-known *Hymenopus coronatus* (Olivier, 1792), distinguished from the latter mainly by the lack of ocular tubercles, a very short process on the vertex, and smaller lobes on the walking legs, which extend only along the distal half of the femora. *Hymenopus coronatus* is known to exhibit true masquerade, imitating a generalized angiosperm inflorescence (Annandale 1900, Tomasinelli 2001, O'Hanlon et al. 2014a, b). *Parymenopus davisoni*, however, is only rarely referenced in the scientific literature. Rehn (1903) comments upon a female from "Trong, Lower Siam", while Beier (1931) recorded additional females (presumably from the Malay Peninsula or northern Borneo, since the other specimens treated in that paper originated from there) and described the male for the first time (p. 153), without providing figures. The confusion about the unjustified emendation of the generic name to *Parhymenopus* by Giglio-Tos (1919, 1927) was clarified by Roy (2007). It is only recently, through the effort of mantid enthusiasts, that this species has achieved some attention and more material is available for study (Heynderycx 2000, Rönisch 2012).

Due to the striking resemblance of Sjöstedt's figure to male specimens of *Parymenopus davisoni*, a possible synonymy seemed likely. Due to the courtesy of Mr. Gunvi Lindberg (NRM), it was possible to examine high resolution photographs of the type of *Helvia cardinalis* (Fig. 1A, B), and to compare it with Beier's description and with specimens of *Parymenopus davisoni* housed in the SMNK and in the author's collection. The data of the investigated specimens are:

♂♀, C Malaysia, Cameron Highlands, 35 km Tapah Richtung Tanah Rata (4.11°N-101.14°E), 2.XI.2001, leg. P. Grabowitz; SMNK (Fig. 1D–F).

♀, N Sumatra, Dolok-Merangir, VIII.1970, leg. L. Diehl; SMNK.

♂♀, S Thailand, Sura Thani (Ban Don) (9.08°N-99.19°E), IX.1987, leg. S. Steinke; SMNK.

4 ♂♂, 10 ♀♀, Malay Peninsula, vic. Merapoh, 3.IX.2010, leg. T. Rönisch & J. Kühne, captive bred, ded. T. Rönisch & A. Willsch, III.–IV.2014; CSC.

There are no significant differences, on the contrary, characteristic diagnostic features, like the shape of the frontal shield and of the eyes, the three maculations on the tegmen (which are likely homologous to the color patterns of other Asian Hymenopodini, see discussion in Wieland 2013), the apically darkened mid and hind femora, the dorsally widened mid and hind tibiae, which are shorter than the corresponding femora and exhibit two light annulations, and particularly the black prosternal band, clearly show the two species to be conspecific. The prosternal band is missing in *Hymenopus*, but found in a closely related Asian genus, *Theopropus* Saussure, 1898. The three genera also share an accentuated sexual dimorphism, and reddish first instars with blackish heads and walking legs that mimic reduviid bugs of the genus *Eulyes* (Shelford 1902, Leong & Teo 2008, Rönisch 2012).

In contrast to the type of *Helvia cardinalis*, the pronotum of the figured male from the Cameron Highlands has concave anterior margins, but this feature, as well as body size, and the intensity of the tegminal maculations, varies between specimens of both sexes and from various locations. It seems to be prone to post-mortem shrinkage in dry-mounted specimens and is of no diagnostic value. This is also the case for the male genitals, which are very simplified in "true" Hymenopodini and very similar even across genera, contrary to the species-specific diversity exhibited by most other mantodeans (Fig. 1G). The minuscule subapical eye tubercle of males referred to by Stål (1877) (barely discernible in Fig. 1A, B, D) is frequently missing at all.

Considering the similarities outlined above, and the uniqueness of the taxon concerned, the two species cannot be maintained as distinct anymore. Therefore, a new synonymy has to be established:

Helvia cardinalis Stål, 1877 = *Parymenopus davisoni* Wood-Mason, 1890, **n. syn.**

The species is distributed in southern Thailand, the Malay Peninsula, Sumatra, and Borneo (Rehn 1903, Giglio-Tos 1919, 1927, Beier 1931, Roy 2007). An occurrence on Java may be expected due to past geographic connections via the Sunda Shelf (Schwarz & Konopik 2014), but needs confirmation.

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A revision of the *Megalopaederus* species of Taiwan (Coleoptera: Staphylinidae: Paederinae)

Volker Assing

Abstract

Megalopaederus Scheerpeltz, 1957, previously regarded as a distinct genus, is assigned to the genus *Paederus* Fabricius, 1775 as a subgenus. The *Megalopaederus* species of Taiwan are revised. In all, eighteen named locally endemic species belonging to two species groups are recognized, thirteen of them are described and illustrated for the first time: *Paederus (Megalopaederus) virgifer* **n. sp.** (Nantou, Chiai); *P. (M.) incurvatus* **n. sp.** (Kaohsiung); *P. (M.) adiectus* **n. sp.** (Pingtung); *P. (M.) aequilobatus* **n. sp.** (Pingtung); *P. (M.) furcispinosus* **n. sp.** (Nantou); *P. (M.) excisissimus* **n. sp.** (Pingtung); *P. (M.) trihamatus* **n. sp.** (Taoyuan); *P. (M.) bivirgatus* **n. sp.** (Hualien); *P. (M.) anmamontis* **n. sp.** (Taichung); *P. (M.) semiflavus* **n. sp.** (Taitung); *P. (M.) alesi* **n. sp.** (Hualien); *P. (M.) discurrens* **n. sp.** (Taichung); *P. (M.) incisus* **n. sp.** (Nantou). Rescriptions and illustrations of the five previously described species, as well as of *P. (M.) lewisi* Cameron, 1930 from Japan and *P. biacutus* Li et al., 2013 from mainland China are provided, and *P. (M.) bucculentus* **n. sp.** (Japan: Honshu: Nagano Prefecture) is described. The latter three species were included in the revision to tentatively assess the phylogenetic affiliations of Taiwanese *Megalopaederus*. *Paederus fulvocaudatus* Adachi, 1939, previously considered a subspecies of *P. kosempoensis* Bernhauer, 1922, represents a distinct species. A lectotype is designated for *P. kosempoensis* Bernhauer, 1922. Additional material composed exclusively of females and probably representing six undescribed species is listed. The available information on the natural history of Taiwanese *Megalopaederus* is compiled. A key to the named species of Taiwan is provided. Their distributions are mapped.

Keywords: Coleoptera, Staphylinidae, Paederinae, *Paederus*, *Megalopaederus*, Palaearctic region, Taiwan, Japan, taxonomy, zoogeography, new species, new status, species groups, lectotype designation, key to species, distribution maps.

Zusammenfassung

Megalopaederus Scheerpeltz, 1957, bisher als eigenständige Gattung betrachtet, wird als Untergattung in die Gattung *Paederus* Fabricius, 1775 gestellt. Die *Megalopaederus*-Arten Taiwans werden revidiert. Insgesamt achtzehn benannte Arten in zwei Artengruppen werden erkannt. Davon werden dreizehn erstmals beschrieben und abgebildet: *Paederus (Megalopaederus) virgifer* **n. sp.** (Nantou, Chiai); *P. (M.) incurvatus* **n. sp.** (Kaohsiung); *P. (M.) adiectus* **n. sp.** (Pingtung); *P. (M.) aequilobatus* **n. sp.** (Pingtung); *P. (M.) furcispinosus* **n. sp.** (Nantou); *P. (M.) excisissimus* **n. sp.** (Pingtung); *P. (M.) trihamatus* **n. sp.** (Taoyuan); *P. (M.) bivirgatus* **n. sp.** (Hualien); *P. (M.) anmamontis* **n. sp.** (Taichung); *P. (M.) semiflavus* **n. sp.** (Taitung); *P. (M.) alesi* **n. sp.** (Hualien); *P. (M.) discurrens* **n. sp.** (Taichung); *P. (M.) incisus* **n. sp.** (Nantou). Die fünf zuvor beschriebenen Arten sowie *P. (M.) lewisi* Cameron, 1930 aus Japan, *P. (M.) bucculentus* **n. sp.** (Japan: Honshu: Nagano) und *P. biacutus* Li et al., 2013 aus China werden redeskribiert bzw. beschrieben und abgebildet. Die drei letztgenannten Arten wurden in die Revision mit einbezogen, um die morphologischen Merkmale und den systematischen Status der *Megalopaederus*-Arten Taiwans bewerten zu können. Bei *Paederus fulvocaudatus* Adachi, 1939, bisher Unterart von *P. kosempoensis* Bernhauer, 1922, handelt es sich um eine eigenständige Art. Für *P. kosempoensis* Bernhauer, 1922 wird ein Lectotypus designiert. Insgesamt sechs weitere Arten, von denen ausschließlich Weibchen verfügbar waren, bleiben unbenannt. Daten zu Lebensweise und Verbreitung der *Megalopaederus*-Arten Taiwans werden zusammengefasst. Eine Bestimmungstabelle wird erstellt. Die Verbreitung der Arten wird anhand von Karten illustriert.

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1 Introduction

The speciose genus *Paederus* Fabricius, 1777 sensu lato currently includes over 600 species worldwide (Newton et al. 2001), which have been assigned to numerous subgenera and genera of uncertain status, or which are currently treated as species incertae sedis. Some of the subgenera and genera were erected by Scheerpeltz (1957), who provided copious descriptions. However, he neither provided arguments justifying the status of the new taxa, nor did he indicate clear diagnostic characters distinguishing them from *Paederus* sensu strictu. One of the new genera described in this article is *Megalopaederus* Scheerpeltz, 1957, to which he assigned three species from Japan, with *Paederus poweri* Sharp, 1874 as the type species. In a revision of the Japanese species, which includes the description of a fourth species, Watanabe (1986) redescribed *Megalopaederus*, but did not provide conclusive evidence justifying the generic status of the taxon either.

A first modern study of the phylogenetic affiliations within *Paederus* sensu lato, based exclusively on morphological characters and generally confined to the fauna of China, was attempted by Li & Zhou (2009). They concluded that some taxa currently considered subgenera and genera, including *Megalopaederus*, were monophyletic, but the remainder of *Paederus* vastly paraphyletic.

According to Smetana (2004), *Megalopaederus* was previously represented in the Palaearctic region by eight species and one subspecies, four species from Japan and four species and one subspecies from Taiwan. One of the species from Japan, *M. poweri* (Sharp, 1874), was subsequently reported also from Shanxi, mainland China, by Hao et al. (2003), but in view of the otherwise highly restricted distributions of *Megalopaederus* species, this record is almost certainly based on a misidentification. According to Watanabe (1986), the distribution of *M. poweri* is confined to the Kii Peninsula, southern Honshu. In contrast to the *Megalopaederus* species of Japan, the Taiwanese representatives of this taxon have not been revised.

Taiwan is reputed for its biodiversity, comprising a high proportion of island and local endemics. This is true also of the Staphylinidae, as is revealed in recent revisions of several taxa, e. g., Quediina of the Staphylinini (Smetana 1995, 1996), *Othius* Stephens, 1829 of the Othiini (Assing 1999), Lathrobiina of the Paederinae (Assing 2010), and *Leptusa* Kraatz, 1856 of the Aleocharinae (Assing 2002; Pace 1995, 1996). Nevertheless, according to Smetana (2004) and an updated version by Schülke (unpublished), the inventory of the staphylinid fauna currently includes "only" some 1160 species and subspecies. However, numerous taxa have not been revised and the true diversity can be expected to be significantly greater, probably comprising several thousand species, a conclusion also confirmed by the results of the present paper.

While the habitats at lower elevations are inhabited mainly by taxa of Oriental affiliations, the montane and subalpine regions of Taiwan primarily host a Palaearctic fauna with numerous endemics. For details on the (zoo-) geography, climate, habitats, and other data pertaining to Taiwan, including colour photographs, see Smetana (1995).

The present study is based primarily on material of *Megalopaederus* collected by Aleš Smetana (Ottawa) during several field trips to Taiwan in the 1990s. Additional material, including types of the previously described species, came from various museum collections. In order to tentatively assess the phylogenetic affiliations of *Megalopaederus* from Taiwan, two *Megalopaederus* species from Japan and one species of the *Paederus biacutus* group from mainland China were included in the study.

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I am indebted to the colleagues indicated in the material section for the loan of material under their care. Shuhei Nomura and Yasutoshi Shibata (both Tokyo) were of invaluable help in locating and organizing a loan of the type material of the species described by Adachi (1939). Special thanks are due to Aleš Smetana (Ottawa) for the generous permission to retain four holotypes and for providing detailed locality data for his samples. Xiao-Yan Li (currently Copenhagen) contributed some *Megalopaederus* material which she had accumulated from various collections and which she had planned to include in her studies of *Paederus* sensu lato from China. Yasutoshi Shibata and Aleš Smetana helped with the identification of some localities. Al Newton (Chicago) checked the new names against his unpublished world catalogue of Paederinae. Benedikt Feldmann (Münster) proof-read and reviewed the manuscript. The helpful comments of the second reviewer, Michael Schülke (Berlin), are appreciated.

2 Material and methods

The material treated in this study is deposited in the following public institutions and private collections:

BMNH	The Natural History Museum, London (R. G. Booth)
cAss	author's private collection
cOhn	private collection Masao Ohno, Tokyo (via Y. Shibata)
cSme	private collection Aleš Smetana, Ottawa
FMNH	Field Museum of Natural History, Chicago (via L. H. Herman and X.-Y. Li)
MHNG	Muséum d'Histoire Naturelle, Genève (G. Cuccodoro)
MNHUB	Museum für Naturkunde der Humboldt-Universität Berlin (J. Frisch, J. Willers)
NHMW	Naturhistorisches Museum Wien (H. Schillhammer)
NSMT	National Science Museum, Tokyo (via X.-Y. Li)
USNM	National Museum of Natural History, Smithsonian Institution, Washington D. C. (via X.-Y. Li)

The morphological studies were conducted using a Stemi SV 11 microscope (Zeiss Germany) and a Jenalab compound microscope (Carl Zeiss Jena). The images of the body parts in dry preparation were created using a photographing device constructed by Arved Lompe (Nienburg) and CombineZ software. For the photographs of body parts in transparent light a digital camera (Nikon Coolpix 995) was used. The maps were created using MapCreator 2.0 (primap) software.

Body length was measured from the anterior margin of the labrum to the posterior margin of the abdominal segment VIII, the length of the forebody from the anterior margin of the labrum to the posterior margin of the elytra, head length from the anterior margin of the frons to the posterior margin of the head, elytral length at the suture from the apex of the scutellum to the posterior margin of the elytra, and the length of the aedeagus from the apex of the longer paramere to the base of the aedeagal capsule. The "parameral" side (i. e., the side where the sperm duct enters) is referred to as the ventral, the opposite side as the dorsal aspect.

The individual labels of type specimens are separated by slashes; they are cited in the original spelling and format, except that slashes were replaced with commas and that capitalized geographic names of countries are given in standard format (i. e., "Taiwan" rather than "TAIWAN"). Moreover, the following adaptations were made according to the general format requirements of the journal: names of persons (except authors of species) in small capitals, scientific names of genera and species in italics, dates with the months always in Roman numbers.

3 Results

3.1 Taxonomy, diversity, and zoogeography

As many as eighteen named *Megalopaederus* species are now known from Taiwan, the five previously described taxa, one of which is raised to species rank, and thirteen newly described species. Six unnamed, most likely additional undescribed species are represented exclusively by females. Therefore, and since all the *Megalopaederus* species of Taiwan have highly restricted, local distributions, it appears likely that a significant number of species still remains to be described and that the actual diversity may amount to around 30 species.

The species are distinguished not only by the male sexual characters, such as the shape and chaetotaxy of the male sternite VII, the shape of the male sternite VIII, and the morphology of the aedeagus (shapes of ventral process, dorsal plate, parameres, and internal structures), but also some, partly conspicuous, external characters. The latter include the coloration of the pronotum, the elytra, the legs, the antennae, and of the abdominal segments VIII–X, as well as the microsculpture of the head and the pronotum (see key in section 3.4). In externally similar and closely related species, however, the internal structures of the aedeagus often offer the best diagnostic characters. In view of this observation it seems rather unfortunate that in the vast majority of previous descriptions of *Paederus* species, even in more recent ones, these structures have neither been assessed nor illustrated.

3.2 Systematic and phylogenetic conclusions

A comparison of morphological characters of the Taiwanese *Megalopaederus* species, of two *Megalopaederus* species from Japan, of a *Paederus* species of the *P. biacutus* group from mainland China (see section 3.7), and of West Palaearctic *Paederus* species yielded no evidence whatsoever that *Megalopaederus* should represent a basal lineage in the *Paederus* sensu lato complex, a conclusion supporting the results by Li & Zhou (2009). Thus, the status of this taxon as a distinct genus is no longer justified. Moreover, it is not even clear if, or likely that, the species currently assigned to *Megalopaederus* form a monophyletic group. This, however, can be clarified more conclusively only based on a more comprehensive phylogenetic approach, which is not within the scope of the present study. In any case, in view of the available evidence and in the interest of the stability of nomenclature, it appears most appropriate to assign *Megalopaederus* to *Paederus* as a subgenus.

Based on the examined species and on the morphological characters, the Taiwanese *Megalopaederus* species are represented by two lineages, the *P. kosempoensis* group and the *P. formosanus* group. The former comprises three named species, *P. kosempoensis*, *P. discurrens*, and *P. incisus*, and is characterized by a slender habitus, the absence of microsculpture on the head and pronotum, slender antennae (antennomeres IV–VIII distinctly more than three times as long as broad), a male sternite VII with a pair of clusters of dense setae, and an aedeagus with a broad, apically not elongated dorsal plate, with somewhat irregularly arranged and/or ill-defined basal internal structures, and with an oblong dorso-apical internal structure. The remaining named species form the *P. formosanus* group and share a more robust body, a mostly microsculptured pronotum (exceptions: *P. formosanus*, *P. alesi*), less slender antennae, a male sternite VII with one cluster of dense setae or with unmodified pubescence, and an aedeagus with an apically elongated dorsal plate, with two to four clearly defined, more or less spine- or rod-shaped basal internal structures, and with a broad-based dorso-apical internal structure, which may be completely reduced in some species.

3.3 Natural history

All the *Megalopaederus* species of Taiwan are apparently strictly locally endemic. The species of the *P. formosanus* group were collected at altitudes between 1500

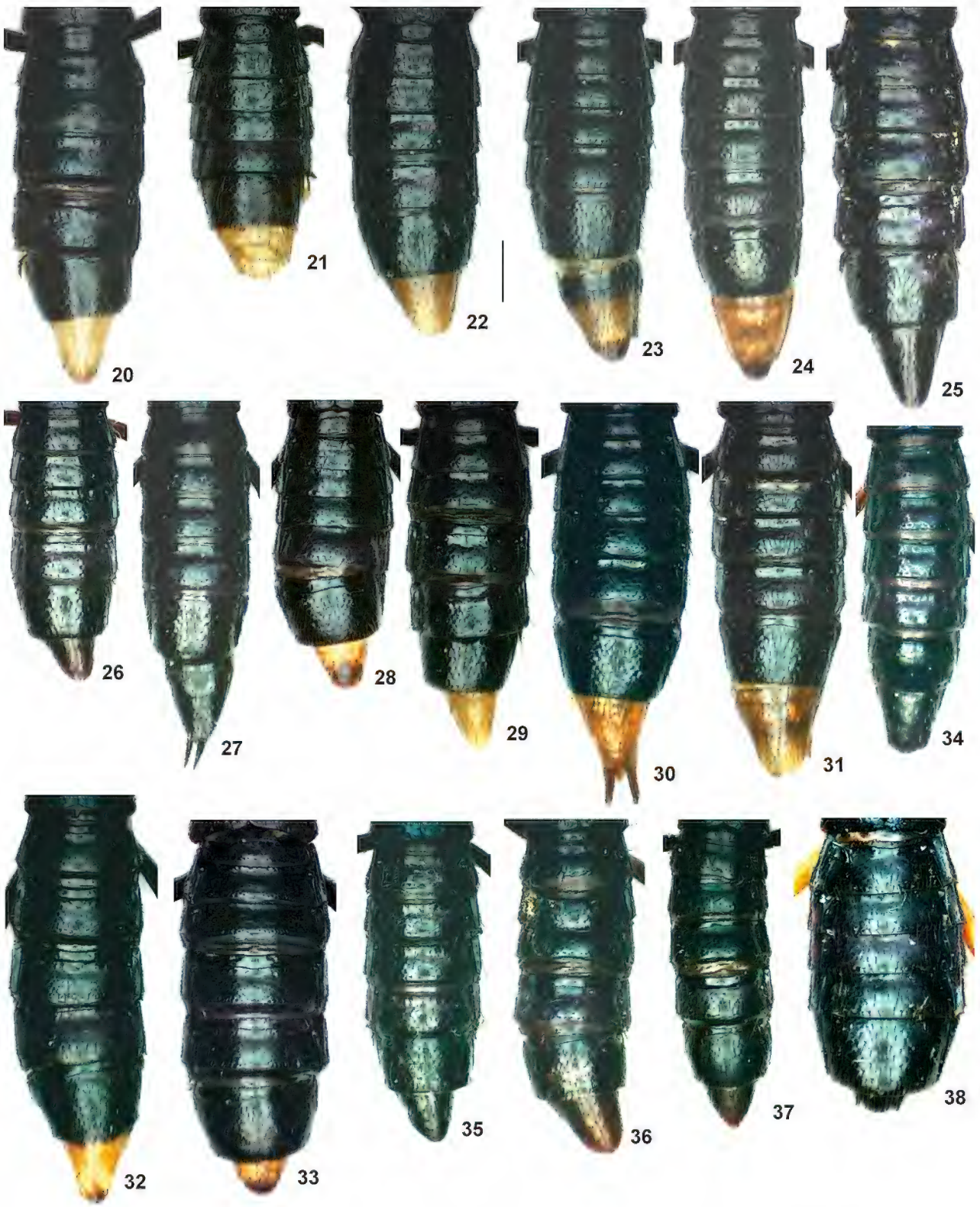
and 2920 m, with the vast majority of records between 2000 and 2700 m. The species of the *P. kosempoensis* group appear to occur at lower elevations (930–1510 m); however, altitudes were indicated only on the labels of *P. discurrens* (930 m) and of two unnamed species (1400 and 1510 m, respectively). The material was generally found in more or less moist habitats. Most of the specimens were sifted from leaf litter, debris, humus, moss, dead wood, etc. on the forest floor of various kinds of forests (broad-leaved evergreen, mixed, coniferous), occasionally also in shrub habitats. Some specimens were collected from fungi, one from human faeces, and one was caught with a yellow pan trap. The observation that numerous specimens were swept from vegetation and one was found in a flight interception trap suggests pronounced climbing activity. The examined material was found from February through November, mostly from April through June. Some specimens collected in May and August are teneral. Several specimens are infested with Laboulbeniales.

According to WATANABE (1986), the Japanese *Megalopaederus* species "are found on shrub or bamboo in mountainous areas".

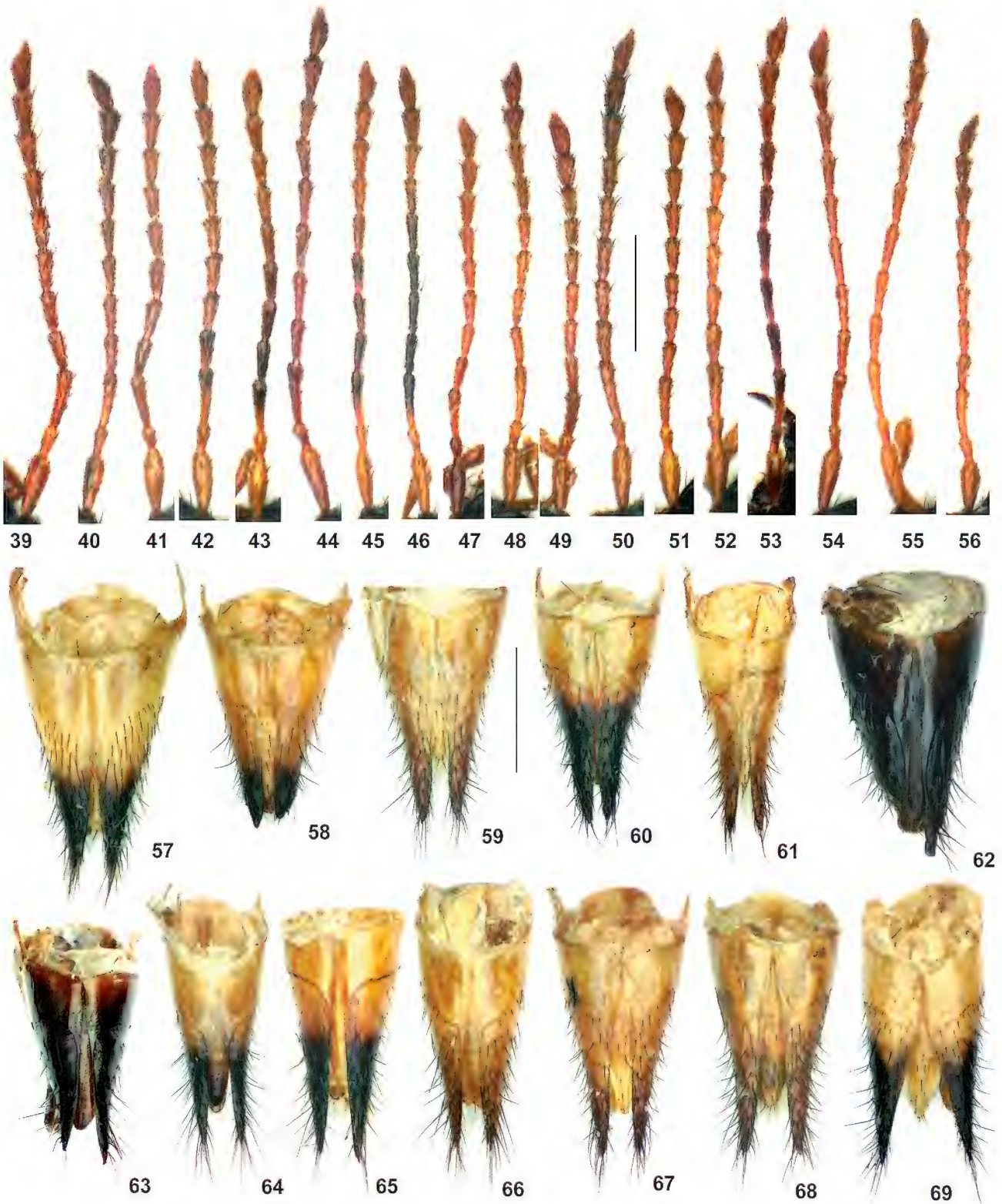
3.4 Key to the named *Megalopaederus* species of Taiwan

1 Pronotum bright reddish to dark reddish-brown. **2**
– Pronotum black. **12**
2 Head and pronotum without trace of microsculpture, glossy (Figs. 15–17). Antennae conspicuously slender; antennomeres IV–VIII distinctly more than three times as long as broad (Figs. 53–55). ♂: sternite VII with pair of clusters of dense setae, in median portion without, or with very sparse, setae (e. g., Figs. 204, 207); aedeagus strongly sclerotized, with broad and apically not elongated dorsal plate, and with oblong dorso-apical internal structure. **3**
– Head and pronotum at least with shallow microsculpture and with more or less reduced shine. Antennae less slender; antennomeres IV–VIII usually less than three times as long as broad, rarely (*P. aequilobatus*) approximately three times as long as broad. ♂: sternite VII with unmodified pubescence or with one cluster of dense setae, in median portion with dense setae; aedeagus mostly less strongly sclerotized, with apically elongated dorsal plate, and with broad-based dorso-apical structure. **5**
3 Scutellum black; femora black with the bases more extensively yellowish to brownish; antennae reddish with antennomeres IV–VI(VII) more or less distinctly darker (Fig. 53). ♂: sternite VII less transverse, in the middle of postero-median impression with sparse setae (Fig. 204); aedeagus with parameres of different length and with apically broadly concave ventral process (Figs. 108–110). ♀: posterior process of sternite VIII relatively narrow and apically acute (Fig. 206). – Chiai Hsien. ..... ***kosempoensis***
– Scutellum reddish with darker margins; femora black with the bases mostly very narrowly paler; antennae uniformly reddish. ♂: sternite VII more transverse, in the middle of postero-median impression without setae; aedeagus with parameres of subequal length and with apically narrowly concave ventral process. **4**
4 ♂: sternite VII with more extensive clusters of setae (Fig. 207); aedeagus (Figs. 111–113) with stouter and apically less acute parameres reaching slightly beyond apex of dorsal plate, with apically concave ventral process (Fig. 211), and with internal structures of distinctive shapes arranged in very disordered fashion (Figs. 209–210). ♀: unknown. – Taichung Hsien. ..... ***discurrens***
– ♂: sternite VII with less extensive clusters of setae (Fig. 212); aedeagus (Figs. 117–119) with more slender and apically more acute parameres extending farther beyond apex of dorsal plate, with apically strongly excised ventral process (Fig. 215), and with internal structures of different shapes (Fig. 214). ♀: posterior process of sternite VIII convex apically (Fig. 216). – Nantou Hsien. ..... ***incisus***
5 Abdominal segment VIII completely black. **6**
– Abdominal segment VIII at least partly yellowish. **8**
6 Abdominal segments IX and X yellowish anteriorly (Fig. 65); tibiae black. ♂: posterior excision of sternite VIII conspicuously deep, more than 0.6 times as deep as length of sternite (Fig. 176); aedeagus (Figs. 96–98) with strongly asymmetric parameres and ventral process, without dorso-apical internal structure and basal internal spines of distinctive shapes (Fig. 177). ♀: posterior median process of sternite VIII conspicuously narrow and long (Fig. 178). – Pingtung Hsien. ..... ***excisissimus***
– Abdominal segments IX and X dark-brown to black anteriorly. ♂: posterior excision of sternite VIII less than 0.6 times as deep as length of sternite; aedeagus of different morphology. ♀: posterior median process of sternite VIII shorter and broader. **7**
7 Large and robust species; length of forebody 6.2–6.3 mm. Tibiae black; elytra black, only with indistinct bluish hue (Fig. 6). ♂: sternite VII with an extensive cluster of numerous moderately short setae in postero-median portion (Fig. 166); aedeagus (Figs. 123–125) strongly sclerotized, 2.9 mm long, with a dorsal plate, four basal and one dorso-apical internal structures of distinctive shapes (Figs. 168–169). ♀: sternite VIII as in Fig. 170. – Pingtung Hsien. ..... ***aequilobatus***
– Much smaller species; length of forebody 4.8–5.2 mm. Tibiae yellowish; elytra with pronounced bluish hue (Fig. 8). ♂: pubescence of sternite VII unmodified (Fig. 171); aedeagus (Figs. 93–95) less strongly modified, 2.2–2.3 mm long, with apically tridentate ventral process, without dorso-apical internal spine and with two basal internal spines of distinctive shapes (Fig. 173). ♀: posterior median process of sternite VIII short and broad (Fig. 174). – Nantou Hsien. ..... ***furcispinosus***
8 Tibiae completely black; antennomeres III–V usually more or less distinctly infuscate apically. **9**
– Tibiae at least in apical portion paler, not black; antennae uniformly reddish. **10**
9 Abdominal segment VIII distinctly bicoloured, with the middle yellowish and the base and the apex blackish (Figs. 23, 158, 161). ♂: aedeagus (Figs. 87–89) approximately 2.5 mm long and with internal structures of distinctive shapes (Figs. 159–160). – Kaohsiung Hsien. ..... ***incurvatus***
– Abdominal segment VIII uniformly yellowish or with somewhat infuscate apex, base always yellowish (Figs. 24, 163). ♂: aedeagus (Figs. 90–92) smaller, approximately 2.3 mm long and with internal structures of different shapes (Figs. 164–165). – Pingtung Hsien. ..... ***adiectus***
10 Head and pronotum with shallow microreticulation and somewhat glossy. Pronotum bright reddish; elytra with vivid bluish hue (Fig. 2); tibiae yellowish. ♂: aedeagus

Figs. 1–19. Forebody. – **1**. *P. flavoterminatus*, paratype. **2**. *P. fulvocaudatus*, holotype. **3**. *P. virgifer*. **4**. *P. incurvatus*. **5**. *P. adiectus*. **6**. *P. aequilobatus*. **7**. *P. furcispinosus*. **8**. *P. excisissimus*. **9**. *P. formosanus*, paratype. **10**. *P. trihamatus*. **11**. *P. bivirgatus*. **12**. *P. anmamontis*. **13**. *P. semiflavus*. **14**. *P. alesi*. **15**. *P. kosempoensis*, lectotype. **16**. *P. discurrens*. **17**. *P. incisus*. **18**. *P. biacutus*. **19**. *P. lewisi*, holotype. – Scale bar: 1.0 mm.



Figs. 20–38. Abdomen. – **20**. *P. flavoterminatus*, paratype. **21**. *P. fulvocaudatus*, holotype. **22**. *P. virgifer*. **23**. *P. incurvatus*. **24**. *P. adiectus*. **25**. *P. aequilobatus*. **26**. *P. furcispinosus*. **27**. *P. excisissimus*. **28**. *P. formosanus*, paratype. **29**. *P. trihamatus*. **30**. *P. bivirgatus*. **31**. *P. anmamontis*. **32**. *P. semiflavus*. **33**. *P. alesi*. **34**. *P. kosempoensis*, lectotype. **35**. *P. discurrens*. **36**. *P. incisus*. **37**. *P. biacutus*. **38**. *P. lewisi*, holotype. – Scale bar: 1.0 mm.



Figs. 39–69. Antenna (39–56) and male tergites IX–X (57–69). – **39**, **57**. *P. flavoterminatus*, paratype. **40**, **58**. *P. fulvocaudatus*, holotype. **41**, **59**. *P. virgifer*. **42**, **60**. *P. incurvatus*. **43**, **61**. *P. adiectus*. **44**, **62**. *P. aequilobatus*. **45**, **63**. *P. furcispinosus*. **46**, **64**. *P. excisissimus*. **47**, **65**. *P. formosanus*. **48**, **66**. *P. trihamatus*. **49**, **67**. *P. bivirgatus*. **50**, **68**. *P. anmamontis*. **51**, **69**. *P. semiflavus*. **52**. *P. alesi*. **53**. *P. kosempoensis*, lectotype. **54**. *P. discurrens*. **55**. *P. incisus*. **56**. *P. biacutus*. – Scale bars: 1.0 mm.

Figs. 70–86. Male tergites IX–X (70–74), female tergites IX–X (75), aedeagus in ventral (76, 80, 83), lateral (77, 81, 84), and dorsal view (78, 82, 85), apical portion of aedeagus in dorsal view (79, 86). – **70**. *P. alesi*. **71**. *P. kosempoensis*, lectotype. **72**. *P. discurrens*. **73**. *P. biacutus*. **74–75**. *P. lewisi*. **76–79**. *P. flavoterminatus*, paratype. **80–82**. *P. fulvocaudatus*, holotype. **83–86**. *P. virgifer*. – Scale bars: 1.0 mm.

Figs. 87–104. Aedeagus in ventral (87, 90, 93, 96, 99, 102), lateral (88, 91, 94, 97, 100, 103), and in dorsal view (89, 92, 95, 98, 101, 104). – **87–89**. *P. incurvatus*. **90–92**. *P. adiectus*. **93–95**. *P. furcispinosus*. **96–98**. *P. excisissimus*. **99–101**. *P. formosanus*, holotype. **102–104**. *P. trihamatus*. – Scale bar: 1.0 mm.

Figs. 105–122. Aedeagus in ventral (105, 108, 111, 114, 117, 120), lateral (106, 109, 112, 115, 118, 121), and in dorsal view (107, 110, 113, 116, 119, 122). – **105–107**. *P. anmamontis*. **108–110**. *P. kosempoensis*, lectotype. **111–113**. *P. discurrens*. **114–116**. *P. biacutus*. **117–119**. *P. incisus*. **120–122**. *P. lewisi*. – Scale bars: 1.0 mm (all species, except *P. lewisi*, to scale).

Figs. 123–134. Aedeagus in ventral (123, 126, 129, 132), lateral (124, 127, 130, 133), and in dorsal view (125, 128, 131, 134). – **123–125**. *P. aequilobatus*. **126–128**. *P. bivirgatus*. **129–131**. *P. alesi*. **132–134**. *P. semiflavus*. – Scale bar: 1.0 mm.

(Figs. 80–82) with apex of dorsal plate far from reaching apex of right paramere and with internal structures of distinctive shapes (Figs. 143–147). – Nantou Hsien. .... ***fulvocaudatus***

– Head and pronotum with pronounced microreticulation and nearly matt. Pronotum usually dark-reddish to brown, rarely bright reddish; elytra with weak bluish hue; tibiae dark reddish with the basal portion more or less extensively blackish. ♂: aedeagus with apex of dorsal plate extending at least to apex of right paramere (ventral view) and with internal structures of different shapes..... **11**

11 Body on average more robust and of larger size; length of forebody 5.4–6.5 mm. Apex of tergite VIII usually more or less distinctly infuscate (Fig. 20); tibiae less extensively

infuscate in basal portion. ♂: aedeagus (Figs. 76–79) larger, 2.7–2.8 mm long, with apical portion of dorsal plate shorter and less slender, and with internal structures of distinctive shapes (Figs. 137–138). ♀: sternite VIII shaped as in Fig. 139. – Nantou Hsien. ..... ***flavoterminatus***

– Body on average smaller; length of forebody 5.4–5.8 mm. Tergite VIII uniformly yellowish (Fig. 21); tibiae more extensively infuscate in basal portion. ♂: aedeagus (Figs. 83–86) smaller, 2.3–2.5 mm long, with apical portion of dorsal plate longer and more slender, and with internal structures of different shapes (Figs. 151–155). ♀: sternite VIII shaped as in Fig. 156. – Nantou Hsien. ..... ***virgifer***

12 Head and pronotum without trace of microreticulation. ... **13**

– Head and pronotum at least with shallow microreticulation. ... **14**

13 Large and robust species; length of forebody 6.0 mm. Head large and strongly transverse, nearly 1.2 times as broad as long and broader than pronotum. Eyes small, approximately one-third as long as postocular region from posterior margin of eye to neck in dorsal view. Elytra short, only 0.5 times as long as pronotum (Fig. 14). ♂: sternite VII conspicuously transverse, with unmodified pubescence (Fig. 201); aedeagus (Figs. 129–131) 2.75 mm long, with ventral process, dorsal plate, and with one dorso-apical and four basal internal structures of distinctive shapes (Fig. 203). ♀: unknown. – Hualien Hsien. ..... ***alesi***

– Smaller and less robust species; length of forebody 4.9–5.2 mm. Head smaller and less transverse, approximately 1.1 times as broad as long. Eyes relatively larger, half as long as postocular region from posterior margin of eye to neck in dorsal view. Elytra 0.55–0.60 times as long as pronotum (Fig. 9). ♂: sternite VII less transverse, with unmodified pubescence (Fig. 79); aedeagus (Figs. 99–101) 2.4–2.5 mm long, with ventral process, dorsal plate, and with one dorso-apical and three basal internal structures of different shapes (Figs. 181–183). ♀: sternite VIII as in Fig. 184. – Taoyuan Hsien. ..... ***formosanus***

14 Head and pronotum with pronounced microsculpture, nearly matt. **15**

– Head and especially pronotum with weakly pronounced microsculpture, usually more or less glossy. **17**

15 Tibiae completely black; segment VIII distinctly bicoloured, yellowish with base of sternite VIII, as well as base and apex of tergite VIII blackish (Figs. 32, 199); posterior portion of hemitergites IX blackish (Fig. 69). ♂: aedeagus with ventral process, dorsal plate, and internal structures of distinctive shapes (Figs. 132–134, 200). – Taitung Hsien. ..... ***semiflavus***

– Tibiae paler (yellowish to dark-reddish) at least in apical portion; segment VIII uniformly yellowish (Fig. 194); posterior portion of hemitergites IX yellowish to moderately infuscate. ♂: aedeagus with ventral process, dorsal plate, and internal structures of different shapes. **16**

16 Body smaller; length of forebody 5.4 mm. Tibiae dark-yellowish; hemitergites IX moderately infuscate in posterior portion; elytra with weak bluish hue. ♂: unknown. – Nantou Hsien. ..... ***alutithorax***

– Body larger; length of forebody 5.4–6.1 mm. Tibiae blackish in basal half and dark-yellowish in apical half; posterior portion of hemitergites very weakly infuscate at most (Fig. 68); elytra with more distinct dark-bluish hue (Fig. 12). ♂: aedeagus with ventral process, dorsal plate, and internal structures of distinctive shapes (Figs. 105–107, 195–196). ♀: sternite VIII as in Fig. 197. – Taichung Hsien. .... ***anmamontis***

17 Pronotum less oblong and broader, approximately 1.05 times as long as broad (Fig. 11). ♂: sternite VIII more transverse; aedeagus (Figs. 126–128) larger, approximately 2.5 mm long, with parameres of different lengths, an apically more elongated and more slender dorsal plate, with a relatively longer left basal and an apically shorter, more slender, and nearly straight dorso-apical internal structure (Fig. 191). ♀: sternite VIII as in Fig. 192. – Hualien Hsien. ..... ***bivirgatus***

– Pronotum more oblong and more slender, 1.08–1.10 times as long as broad (Fig. 10). ♂: sternite VIII less transverse; aedeagus (Figs. 102–104) smaller, approximately 2.2 mm long, with parameres of subequal length, an apically less elongated and less slender dorsal plate, and with a shorter left basal, and a medially distinctly angled, stouter, and longer dorso-apical structure (Fig. 187). ♀: sternite VIII as in Fig. 188. – Taoyuan Hsien. ..... ***trihamatus***

3.5 The *Megalopaederus* species of Taiwan

Paederus (Megalopaederus) flavoterminatus Cameron, 1949
(Figs. 1, 20, 39, 57, 76–79, 135–139, 226)

Paederus flavoterminatus Cameron 1949: 466.

Type material examined

Paratype ♂: "♂ / Musha, Formosa. V-21-32 / L. Gressitt Collector / *Paederus flavoterminatus* Cam, Cotype / Co-Type / M. Cameron. Brequest. B. M. 1955-147. / *Paederus flavoterminatus* Cameron, det. V. Assing 2014" (BMNH). – Additional paratypes: see type material of *P. virgifer*.

Additional material examined

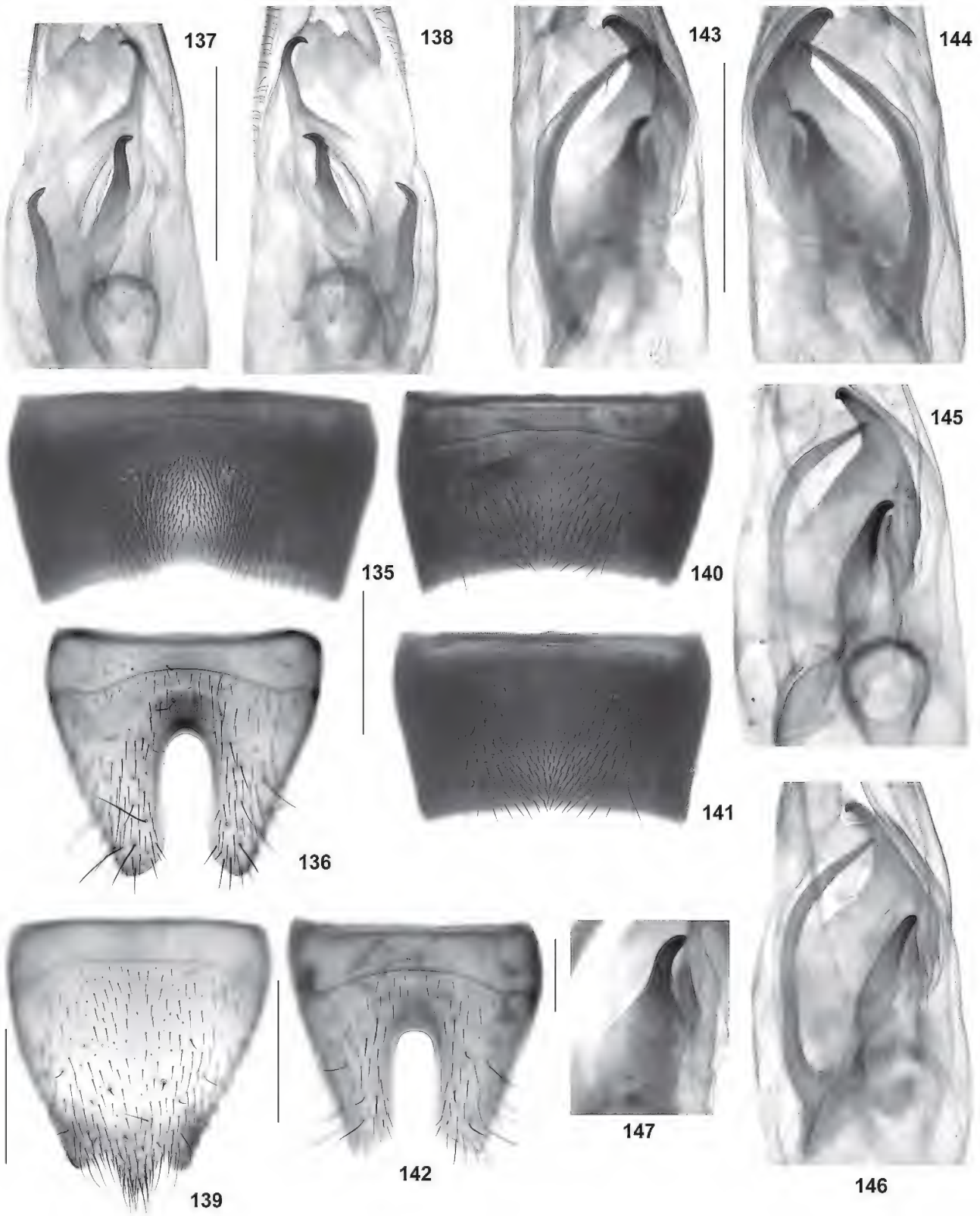
Taiwan: 2 ♂♂, 1 ♀, Nantou Hsien, Meifeng, 2130 m, 3.V.1991, leg. Smetana [T61] (cSme, cAss); 1 ♀, Nantou Hsien, Meifeng, 2130 m, 3.V.1991, leg. Smetana [T62] (cSme); 1 ♂, Nantou Hsien, Meifeng, 23.III.1998, leg. Sugaya (MNHUB); 1 ♂, 1 ♀, Nantou Hsien, Nenkaoshan trail, Yuenhai Hut, 2350 m, 4.V.1992, leg. Smetana [T112] (cSme, cAss); 6 ♀♀, Nantou Hsien, Houhuanshan, 2300–2500 m, 15.V.1990, leg. LeSage (cSme, cAss).

Comment

The original description is based on a holotype and 17 paratypes from "Formosa, Musha (V-20-32), Arisan (VI-4-32, V-25-34)"; the type locality is "Formosa, Musha" (today Jenai; 24°02′N, 121°08′E) (Cameron 1949). Three paratypes, a male from "Musha" in the Cameron collection and two paratypes (a male and a female) from "Arisan" deposited in USNM, were examined. The latter two specimens are not conspecific with the paratype (and evidently the holotype) from the type locality.

Redescription

Large and robust species. Body length 10.0–14.0 mm; length of forebody 5.4–6.5 mm. Coloration (Figs. 1, 20, 39, 57): head black; pronotum bright-reddish to dark-reddish; elytra black with distinct bluish hue; abdomen: segments III–VII black, segments VIII and X pale-yellowish with the extreme apex of tergite VIII usually more or less distinctly



Figs. 135–147. *Paederus flavoterminatus* (135–139; 135–138: paratype) and *P. fulvocaudatus* (140–147; 140, 142–144, 147: holotype). – **135**, **140–141**. Male sternite VII. **136**, **142**. Male sternite VIII. **137**, **143**, **145–147**. Internal structures of aedeagus in ventral view. **138**, **144**. Internal structures of aedeagus in dorsal view. **139**. Female sternite VIII. – Scale bars: 1.0 mm (135–146), 0.2 mm (147).

infuscate, hemitergites IX bicoloured with the anterior half pale-yellowish and the posterior half blackish; legs with the femora black and the remainder (except for the more or less distinctly and more or less extensively infuscate bases of the metatibiae) reddish; antennae reddish.

Head (Fig. 1) distinctly transverse, 1.12–1.15 times as broad as long; contours of posterior portion (behind eyes) broadly convex in dorsal view; punctation relatively fine and sparse; interstices much broader than diameter of punctures, with pronounced fine microreticulation; dorsal surface nearly matt. Eyes strongly convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 39) 3.8–4.4 mm long and slender, antennomeres IV–X more than twice as long as broad.

Pronotum (Fig. 1) approximately 1.05 times as long as broad and 1.02–1.05 times as broad as head, strongly convex in cross-section; punctation sparse and slightly more distinct than that of head; midline broadly impunctate; microsculpture similar to that of head, dorsal surface nearly matt.

Elytra (Fig. 1) approximately 0.6 times as long as pronotum and of distinctly trapezoid shape (i. e., strongly dilated posteriad); humeral angles obsolete; punctation coarse and moderately dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III.

Abdomen (Fig. 20) approximately 1.15 times as broad as elytra at posterior margin; punctation moderately fine and moderately dense; interstices much broader than diameter of punctures, with distinct fine microsculpture composed of transverse meshes; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 135) moderately strongly transverse, with pronounced impression in postero-median portion, this impression with conspicuously dense and short setae, posterior margin distinctly concave; sternite VIII (Fig. 136) distinctly transverse, nearly 1.2 times as broad as long, posterior excision U-shaped and deep, nearly 0.6 times as deep as length of sternite; tergites IX and X as in Fig. 57; aedeagus (Figs. 76–79) large, 2.7–2.8 mm long; ventral process apically tridentate; right paramere distinctly longer than left paramere, apically acute; left paramere truncate; dorsal plate slightly asymmetric, apically elongated and weakly hooked; internal sac (Figs. 137–138) with two basal and one apical sclerotized spines of distinctive shapes, all spines apically hooked.

♀: sternite VIII (Fig. 139) oblong, posteriorly with distinct process of acutely triangular shape.

Comparative notes

Paederus flavoterminatus is characterized particularly by the coloration, the large and robust body, the morphology of the aedeagus, and by the shape and chaetotaxy of the male sternite VII.

Distribution and natural history

This species is currently known from several localities in Nantou Hsien (Fig. 226); the type locality is situated at 24°02′N, 121°08′E. The specimens were collected at altitudes of 2130–2350 m, partly together with the sympatric *P. fulvocaudatus*, in March and May. The material collected by A. Smetana and L. LeSage was sifted from debris among lush vegetation along a deserted forest road (T61) and from moss and humus on and under huge fallen trees (T62) in a broad-leaved forest, sifted from lush vegetation and litter along a small stream in a broad-leaved evergreen forest with mixed pine trees (T112), and swept from vegetation along a highway in Houhouanshan, respectively (Smetana pers. comm.).

Paederus (Megalopaederus) fulvocaudatus Adachi, 1939, **n. stat.**

(Figs. 2, 21, 40, 58, 80–82, 140–147, 227)

Paederus kosempoensis var. *fulvocaudatus* Adachi 1939: 166.

Type material examined

Holotype ♂: "Musha-Tatsutaka [today Sungkang; 24°03′N, 121°10′E], Formosa, 24.May.1927, K. Yokoyama. / ♂ / Holotype / *Paederus kosempoensis* Bernh. var. *fulvocaudatus* Adachi, det. T. Adachi / *Paederus fulvocaudatus* Adachi, det. V. Assing 2014" (cOhn). – Paratype: see type material of *P. virgifer*.

Additional material examined

Taiwan: 1 ♂, Nantou Hsien, Meifeng, 2130 m, 10.VII.1993, leg. Smetana [T146] (cSme); 1 ♂, Nantou Hsien, Meifeng, 2130 m, yellow pan traps, 10–17.VII.1993, leg. Smetana [T147] (cAss); 4 ♂♂, 7 ♀♀, Nantou Hsien, Meifeng, 23.III.1998, leg. Sugaya (MNHUB, cAss); 1 ♂, Nantou Hsien, Nan-shan-hsi ["Nanchanchi"; 24°00′N, 121°04′E], 24.VI.1998, leg. Sugaya (cAss); 1 ♂, 2 ♀♀, Nantou Hsien, Sungkang-Tsifeng, 2000–2300 m, 29.VI.1965, leg. Nakane (NSMT); 4 ♀♀ [one teneral; two infested with Laboulbeniales], Nantou Hsien, Rueiyan River Major Wildlife Habitat, 24°06′N, 121°11′E, 2100 m, from small bracket fungi, 8.VIII.2008, leg. Mendel & Barclay (BMNH, cAss); 1 ♀, Nantou Hsien, 24°03′N, 121°13′E, 1920 m, 6.VIII.2008, leg. Barclay, Mendel & Evers (BMNH).

Comment

The original description is based on a male holotype from "Formosa: Musha" and a female paratype from "Formosa: Mt. Ari" (= Ali Shan) deposited in "Yokoyasma's collection … in Tokyo Agricultural University" and in "col. Hiroshi Inoue", respectively (Adachi 1939). The two type specimens, which were found in the private collection of Masao Ohno, are not conspecific; the paratype belongs to *P. virgifer* (see the following section). An examination of the holotype revealed that *P. fulvocaudatus* represents a

distinct species that is more closely allied to *P. flavoterminatus* and the following species than to *P. kosempoensis*.

Redescription

Body length 10.0–11.5 mm; length of forebody 5.4–5.7 mm. Coloration (Figs. 2, 21, 40, 58): head black; pronotum bright reddish; elytra black with distinct bluish hue; abdomen: segments III–VII black, segments VIII and X pale-yellowish, tergite VIII sometimes slightly infuscate at apex, hemitergites IX bicoloured with the anterior half pale-yellowish and the posterior half blackish; legs with the femora black and the remainder reddish; antennae reddish.

Head (Fig. 2) distinctly transverse, 1.07–1.10 times as broad as long; contours of posterior portion (behind eyes) weakly convex (nearly straight) in dorsal view, converging towards neck from posterior margin of eyes, posterior angles obsolete; punctation moderately coarse and sparse, in median and anterior dorsal portions very sparse; interstices much broader than diameter of punctures, with distinct fine microreticulation. Eyes strongly convex, slightly less than half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 40) 3.8–4.0 mm long and slender, antennomeres IV–X more than twice as long as broad.

Pronotum (Fig. 2) 1.07–1.10 times as long as broad and 0.97–1.02 times as broad as head, strongly convex in cross-section; punctation sparse and slightly more distinct than that of head; midline broadly impunctate; microsculpture shallow, dorsal surface glossy.

Elytra (Fig. 2) 0.65–0.70 times as long as pronotum and of distinctly trapezoid shape (i. e., strongly dilated posteriad); humeral angles obsolete; punctation coarse and moderately dense. Hind wings completely reduced. Metatarsomere I shorter than the combined length of II and III.

Abdomen (Fig. 21) approximately 1.2 times as broad as elytra at posterior margin; punctation moderately fine and moderately dense; interstices much broader than diameter of punctures, with distinct fine microsculpture composed of transverse meshes; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Figs. 140–141) moderately strongly transverse, with shallow impression in postero-median portion, this impression with moderately dense and moderately short setae, posterior margin weakly concave; sternite VIII (Fig. 142) distinctly transverse, 1.15 times as broad as long, posterior excision U-shaped and deep, 0.55 times as deep as length of sternite; tergites IX and X as in Fig. 58; aedeagus (Figs. 80–82) approximately 2.5 mm long; right paramere slightly longer than left paramere, both parameres acute; dorsal plate slightly asymmetric, apically elongated and weakly hooked; internal sac (Figs. 143–147) with two basal and one apical sclerotized spines of distinctive shapes, the left basal spine (ventral view) long, strongly curved, and rod-shaped.

♀: sternite VIII of similar shape as in *P. flavoterminatus*.

Intraspecific variation

The shape of the right basal internal structure of the aedeagus is subject to some intraspecific variation. Moreover, the apex of the abdominal tergite VIII may be yellowish or somewhat infuscate.

Comparative notes

From the similarly coloured and geographically close *P. flavoterminatus*, *P. fulvocaudatus* is distinguished by the smaller and less robust body, the differently shaped head, the on average paler coloration of the pronotum, the uniformly yellowish tergite VIII (but see above), the shorter metatarsomere I, the less strongly microsculptured glossy pronotum, the less transverse male sternite VII with a shallower postero-median impression and with a weakly modified chaetotaxy, as well as by the smaller aedeagus with internal structures of different shapes (particularly the rod-like basal structure).

Distribution and natural history

The species is known from several localities in Nantou Hsien (Fig. 227). The specimens were found from March through August, partly together with the sympatric *P. flavoterminatus*. The specimens collected by A. SMETANA were sifted from moss on fallen trees, rotting wood, leaf litter, and other debris (T146) and caught with a yellow pan trap (T147) in a primary broad-leaved evergreen forest (SMETANA pers. comm.). Some specimens were found on fungi. The altitudes range from 1920 to 2300 m. One specimen collected in August is teneral, two are infested with Laboulbeniales.

Paederus (Megalopaederus) virgifer **n. sp.**

(Figs. 3, 22, 41, 59, 83–86, 148–156, 226)

Paederus kosempoensis var. *fulvocaudatus*, partim: ADACHI (1939); misidentification.

Paederus flavoterminatus, partim: CAMERON (1949); misidentification.

Type material

Holotype ♂: "Taiwan Chiai Hsien, Yushan N. P., Mun-Li Cliff, 2700 m 27.IV.1990, A. SMETANA [T28] / Holotypus ♂ *Paederus virgifer* sp. n., det. V. ASSING 2014" (cSme).

Paratypes: 2 ♂♂, 1 ♀ [1 ♂ slightly teneral]: same data as holotype (cSme, cAss); 1 ♀: "Taiwan Nantou Hsien, Yushan N. P., Mun-Li Cliff, 2700 m 18.V.91, A. SMETANA [T86]" (cSme); 1 ♂, 4 ♀♀: "Taiwan: Alishan, Chiai Hsien, 2180 m, 24.IV.1990 Sister Ponds. Fauch. forêt, LESAGE 90-24" (cSme, cAss); 1 ♂, 2 ♀♀: "Taiwan Chiai Hsien, Alishan, 2200 m 26.IV.1990, A. SMETANA [T25]" (cAss); 1 ♀: "Mt. Ari (2.200 m) Formosa, 9-June-1938.

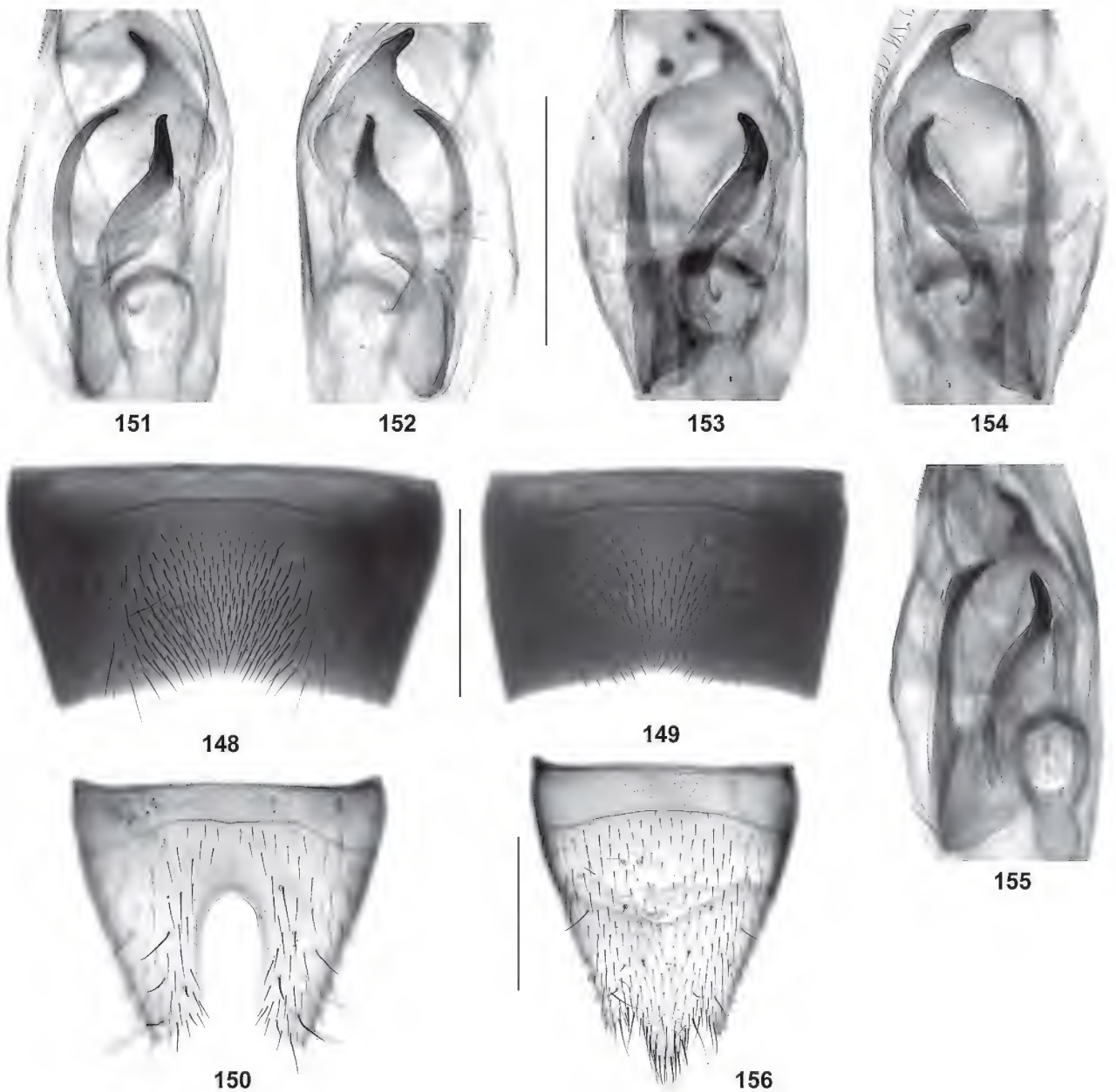
Coll. Hiroshi Inoue. / ♀ / Allotype / *Paederus kosempoensis* Bernh. var. *fulvocaudatus* Adachi, det. T. Adachi" (cOhn); 1 ♂, 1 ♀: "Formosa, Arisan, V25'34 / JLGressit Collector / Paratype [of *P. flavoterminatus*] No. 53738, USNM" (USNM); 1 ♀: "Taiwan, Alishan, 2300 m, Nantou Hsien, 5–6.VII.1965, leg. T. Yamasaki" (NSMT); 1 ♀: "Taiwan: Chiayi Co., Alishan, Nat. Scen. Area, Rd 18, km 85 / + Rd to Youth Activ. Center, ca. 2000 m, for. litter, 11.IV.2009, S. Vít" (MHNG); 2 ♂♂: "Taiwan, Nantou/Chiai Co., SE of Alishan, 2300 m, 23°28′20″N, 120°51′E, L. Dembický leg., 6.–8.XI.2008, BMNH 2008-85" (BMNH, cAss).

Etymology

The specific epithet (Latin, adjective: carrying a rod) alludes to the rod-shaped basal internal structure of the aedeagus.

Comment

Paederus virgifer has been confounded with the two preceding species. The paratypes listed above include previously misidentified paratypes of *P. flavoterminatus* and *P. fulvocaudatus*.



Figs. 148–156. *Paederus virgifer* (148, 150–152: Yushan; 149, 153–154, 156: Alishan; 155: paratype of *P. flavoterminatus*). – **148–149**. Male sternite VII. **150**. Male sternite VIII. **151**, **153**, **155**. Internal structures of aedeagus in ventral view. **152**, **154**. Internal structures of aedeagus in dorsal view. **156**. Female sternite VIII. – Scale bars: 1.0 mm.

Description

Body length 10.0–13.0 mm; length of forebody 5.4–5.8 mm. Coloration (Figs. 3, 22, 41, 59): head black; pronotum dark-reddish to dark reddish-brown; elytra black with distinct bluish hue; abdomen: segments III–VII black, segments VIII and X pale-yellowish, hemitergites IX pale-yellowish, posteriorly weakly infuscate at most; legs with the femora black, the tibiae dark-reddish with the basal portion more or less extensively blackish-brown to blackish, and the tarsi reddish; antennae reddish.

Head (Fig. 3) distinctly transverse, 1.12–1.15 times as broad as long; contours of posterior portion (behind eyes) strongly convex in dorsal view, posterior angles weakly marked; punctation rather fine and sparse, in median and anterior dorsal portions somewhat sparser; interstices much broader than diameter of punctures, with pronounced fine microreticulation rendering the dorsal surface nearly matt. Eyes strongly convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 41) 3.8–4.1 mm long and slender, antennomeres IV–X more than twice as long as broad.

Pronotum (Fig. 3) approximately 1.05 times as long as broad and 1.03–1.05 times as broad as head, strongly convex in cross-section; punctation sparse and slightly more distinct than that of head; midline broadly impunctate; microsculpture similar to that of head.

Elytra (Fig. 3) approximately 0.65 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation coarse and moderately dense. Hind wings completely reduced. Metatarsomere I shorter than the combined length of II and III.

Abdomen (Fig. 22) approximately 1.2 times as broad as elytra at posterior margin; punctation moderately fine and moderately dense; interstices much broader than diameter of punctures, with distinct fine microsculpture composed of transverse meshes; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Figs. 148–149) strongly transverse, with distinct impression in postero-median portion, this impression with very dense and short setae, posterior margin weakly concave; sternite VIII (Fig. 150) distinctly transverse, posterior excision U-shaped and deep, approximately 0.55 times as deep as length of sternite; tergites IX–X as in Fig. 59; aedeagus (Figs. 83–86) 2.3–2.5 mm long; right paramere longer than left paramere, both parameres acute apically; dorsal plate slightly asymmetric, apically strongly elongated and weakly hooked, extending at least to, usually beyond, apex of right paramere; internal sac (Figs. 151–155) with two basal and one apical sclerotized spines of distinctive shapes, the left basal spine (ventral view) long, smoothly curved, and rod-shaped.

♀: sternite VIII oblong, shaped as in Fig. 156.

Comparative notes

Paederus virgifer is distinguished from the similarly coloured and geographically close *P. flavoterminatus* and *P. fulvocaudatus*, with which it was previously confounded, by the posteriorly less strongly darkened hemitergites IX, as well as by the apically more strongly elongated dorsal plate and the shapes of the internal structures of the aedeagus. It additionally differs from *P. fulvocaudatus* by the darker coloration of the pronotum, the darker tibiae, the more pronounced microsculpture on the head and pronotum, and by the more transverse male sternite VII with a more distinctly modified chaetotaxy, and from *P. flavoterminatus* by smaller average size and the uniformly yellowish tergite VIII.

Distribution and natural history

The known distribution is confined to the Alishan and the Yushan regions in Nantou Hsien (Fig. 226). The altitudes range from 2000 to 2700 m. The material collected by A. SMETANA was found crawling on the rails of a narrow gauge forest railway (T25) and sifted from moss, old vegetation, and various forest floor debris in an original, mostly coniferous forest with dense undergrowth (T28, T86) (SMETANA pers. comm.). The specimens collected by L. LESAGE were swept from vegetation along a road (SMETANA pers. comm.).

Paederus (Megalopaederus) incurvatus **n. sp.**

(Figs. 4, 23, 42, 60, 87–89, 157–161, 226)

Type material

Holotype ♂: "Taiwan, Kaohsiung Hsien, Peinantashan trail, 2250 m, 4.VII.1993, A. SMETANA [T137] / Holotypus ♂ *Paederus incurvatus* sp. n., det. V. ASSING 2014" (cSme).

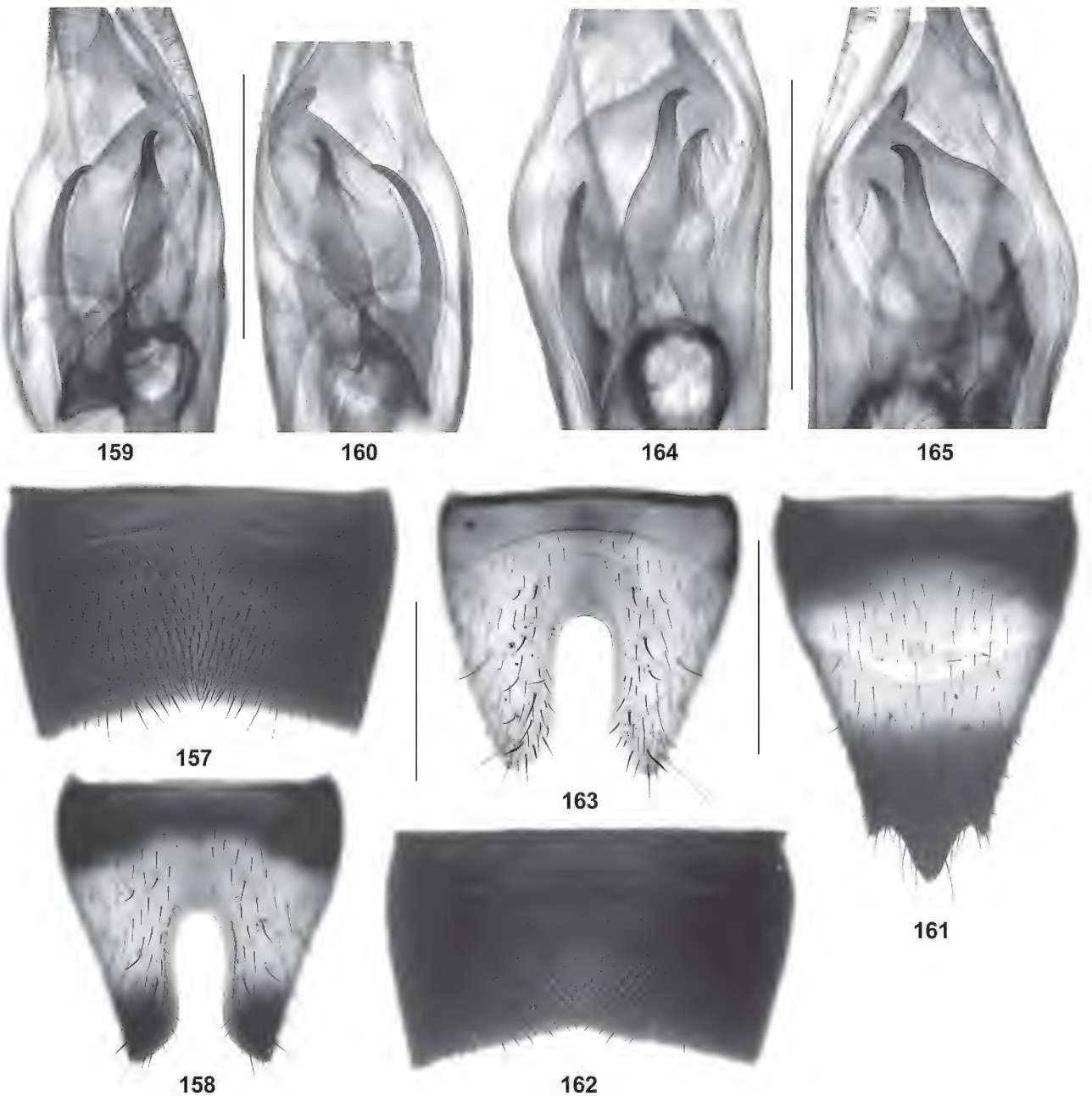
Paratypes: 2♂♂, 3♀♀: same data as holotype (cSme, cAss); 2♀♀: "Taiwan, Kaohsiung Hsien, Peinantashan trail, 2500 m, 4.VII.1993, A. SMETANA [T136]" (cSme); 1♀: "Taiwan, Kaohsiung Hsien, Peinantashan trail, 2065 m, 6.VII.1993, A. SMETANA [T140]" (cSme); 2♀♀: "Taiwan, Kaohsiung Hsien, Peinantashan trail, 2080 m, 6.VII.1993, A. SMETANA [T141]" (cSme); 2♂♂: "Taiwan, Kaohsiung Hsien, Peinantashan trail, 2020 m, 7.VII.1993, A. SMETANA [T143]" (cSme, cAss); 2♀♀: "Taiwan, Kaohsiung Hsien, Peinantashan trail, 2000 m, 7.VII.1993, A. SMETANA [T144]" (cSme, cAss); 2♂♂, 4♀♀: "Taiwan, Kaohsiung Hsien, Kuanshan trail at Kaunshanchi Riv., 2400 m, 20.IV.1992, A. SMETANA [T94]" (cSme, cAss).

Etymology

The specific epithet is the past participle of the Latin verb incurvare (to bend) and alludes to the curved long basal internal structure of the aedeagus.

Description

Body length 9.7–11.0 mm; length of forebody 5.0–5.6 mm. Coloration (Figs. 4, 23, 42, 60): head black; pro-



Figs. 157–165. *Paederus incurvatus* (157–161) and *P. adiectus* (162–165). – **157**, **162**. Male sternite VII. **158**, **163**. Male sternite VIII. **159**, **164**. Internal structures of aedeagus in ventral view. **160**, **165**. Internal structures of aedeagus in dorsal view. **161**. Female sternite VIII. – Scale bars: 1.0 mm.

notum reddish to dark-reddish; elytra black with distinct bluish hue; abdomen: segments III–VII black, segment VIII yellowish with the base and the apex brown to black, hemitergites IX yellowish anteriorly and black posteriorly, tergite X yellowish; legs black, with the tarsi slightly paler (brown to blackish brown); antennae reddish, with the apices of antennomeres III–V more or less distinctly darker.

Head (Fig. 4) transverse and of rather variable shape, 1.07–1.15 times as broad as long, on average more transverse in male than in female; contours of posterior portion (behind eyes) usually converging from posterior margin of eyes, on average more convex in male than in female; posterior angles mostly weakly marked in male and obsolete in female; punctation rather fine and sparse; interstices

several times as broad as diameter of punctures, with pronounced fine microreticulation rendering the dorsal surface nearly matt. Eyes moderately convex, usually slightly more than half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 42) 3.5–4.0 mm long and slender, antennomeres IV–X more than twice as long as broad.

Pronotum (Fig. 4) 1.05–1.10 times as long as broad and approximately as broad as head, strongly convex in cross-section; punctation sparse and slightly more distinct than that of head; midline broadly impunctate; microsculpture similar to that of head.

Elytra (Fig. 4) approximately 0.65 times as long as pronotum and strongly dilated posteriad; humeral angles obsolete; punctation coarse and moderately dense. Hind wings completely reduced. Metatarsomere I shorter than the combined length of II and III.

Abdomen (Fig. 23) approximately 1.10–1.15 times as broad as elytra at posterior margin; punctation moderately fine and moderately dense; interstices much broader than diameter of punctures, with pronounced fine microsculpture composed of transverse meshes; tergite VII somewhat more glossy than anterior tergites; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 157) moderately strongly transverse, with shallow impression in postero-median portion, this impression with moderately dense and moderately short setae, posterior margin weakly concave; sternite VIII (Fig. 158) weakly transverse, posterior excision U-shaped and deep, nearly 0.55 times as deep as length of sternite; tergites IX and X as in Fig. 60; aedeagus (Figs. 87–89) approximately 2.5 mm long; right paramere longer than left paramere, both parameres acute apically; ventral process apically notched or unnotched; dorsal plate slightly asymmetric, apically strongly elongated and hooked, extending slightly beyond apex of right paramere; internal sac (Figs. 159–160) with two basal and one dorso-apical sclerotized spines of distinctive shapes, the left basal spine (ventral view) moderately long and strongly curved.

♀: sternite VIII distinctly oblong, shaped as in Fig. 161.

Intraspecific variation

The aedeagus of the male from Kuanshan is distinguished from those from Peinantashan by the apically unnotched ventral process and by the longer apical process of the dorso-apical internal structure. Since no other distinguishing characters were found, these differences are interpreted as intra- rather than interspecific variation.

Comparative notes

Among the species with a distinctly microsculptured reddish pronotum, *P. incurvatus* is characterized particularly by the bicoloured abdominal segment VIII (base and apex infuscate, middle yellow), the apically infuscate antennomeres III–V, the black tibiae, and by the morphology of the aedeagus (shapes of dorsal plate and of internal structures).

Distribution and natural history

The type specimens were collected in several localities along the Peinantashan Trail and one in Kuanshan, Kaohsiung Hsien (Fig. 226), at altitudes of 2000–2500 m. They were found by sifting moss, dead vegetation, and humus among dense shrubs along a river (T94), by sifting moist to wet debris and leaf litter among dense shrubs (T136), by sifting leaf litter and various debris around tree stumps and along fallen trees in a secondary mixed forest (T137), by sifting various debris and leaf litter along the "in slope" wall of an old overgrown logging road in a broad-leaved evergreen forest (T141, T144), and by sifting mushrooms, moss, bark, and debris along large fallen trees in a mature broad-leaved evergreen forest (T143) (SMETANA pers. comm.).

Paederus (Megalopaederus) adiectus **n. sp.**

(Figs. 5, 24, 43, 61, 90–92, 162–165, 226)

Type material

Holotype ♂: "Taiwan, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2130 m, 27.IV.1992, A. SMETANA [T101] / Holotypus ♂ *Paederus adiectus* sp. n., det. V. ASSING 2014" (cSme).

Paratypes: 2 ♂♂: same data as holotype (cAss); 3 ♀♀: same data as holotype, but "30.IV.1992 … [T109]" (cSme, cAss); 1 ♀: "Taiwan, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2125 m, 27.IV.1992, A. SMETANA [T102]" (cSme); 1 ♀: "Taiwan, Pingtung Hsien, Peitawushan ridge, 2800–2910 m, 28.IV.1992, A. SMETANA [T105]" (cSme); 1 ♂, 2 ♀♀: "Taiwan, Pingtung Hsien, Peitawushan, above Kuai-Ku Hut, 2750 m, 29.IV.1992, A. SMETANA [T107]" (cSme, cAss).

Etymology

The specific epithet is the past participle of the Latin verb adicere (to add) and alludes to the presence of an additional basal internal structure of the aedeagus.

Description

Body length 10.0–11.0 mm; length of forebody 5.0–5.5 mm. Coloration (Figs. 5, 24, 43, 61): head black; pronotum reddish; elytra black with distinct bluish hue; abdomen: segments III–VII black, segment VIII yellowish with the apex of tergite VIII often more or less distinctly infuscate, hemitergites IX yellowish, sometimes infuscate in posterior half, tergite X yellowish; legs black with brown tarsi; antennae reddish, with antennomeres III–V more or less distinctly darker.

Head (Fig. 5) transverse, 1.07–1.13 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, broadly convex;

posterior angles usually practically obsolete; punctation moderately fine and sparse; interstices much broader than diameter of punctures, with pronounced fine microreticulation rendering the dorsal surface nearly matt. Eyes moderately convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 43) 3.7–4.0 mm long and slender, antennomeres IV–X more than twice as long as broad.

Pronotum (Fig. 5) approximately 1.07 times as long as broad and 1.00–1.04 times as broad as head, strongly convex in cross-section; punctation and microsculpture similar to those of head; midline broadly impunctate.

Elytra (Fig. 5) approximately 0.6 times as long as pronotum and strongly dilated posteriad; humeral angles obsolete; punctation moderately coarse and moderately dense. Hind wings completely reduced. Metatarsomere I slightly shorter than the combined length of II and III.

Abdomen (Fig. 24) approximately 1.1–1.2 times as broad as elytra at posterior margin; punctation moderately fine and moderately dense; interstices much broader than diameter of punctures, with distinct fine microsculpture composed of transverse meshes; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 162) strongly transverse, with moderately deep impression in postero-median portion, this impression with dense and moderately short setae, posterior margin weakly concave; sternite VIII (Fig. 163) moderately transverse, posterior excision U-shaped and deep, approximately 0.55 times as deep as length of sternite; tergites IX–X as in Fig. 61; aedeagus (Figs. 90–92) 2.3–2.4 mm long; right paramere longer than left paramere, both parameres acute apically; dorsal plate slightly asymmetric, apically strongly elongated and weakly hooked, extending to, or slightly beyond, apex of right paramere; internal sac (Figs. 164–165) with three basal and one dorso-apical sclerotized spines of distinctive shapes, the left basal spine (ventral view) relatively short and weakly curved, the right basal spine small and apically hooked.

♀: sternite VIII distinctly oblong, of similar shape as in *P. virgifer* and *P. incurvatus*.

Comparative notes

Among the species with a distinctly microsculptured reddish pronotum and a yellowish abdominal segment VIII, *P. adiectus* is characterized particularly by the morphology of the aedeagus, especially the shape of the dorsal plate, the presence of an additional basal structure, and the shapes of the other internal structures.

Distribution and natural history

The type specimens were found in several geographically close localities in the Peitawushan in Pingtung Hsien (Fig. 226) at altitudes between approximately 2100 and 2900 m. They were collected by sifting forest floor debris (T101) and lush vegetation, debris, and moss (T102) in an original broad-leaved evergreen forest, by sifting various debris on the main ridge of Peitawushan with solitary fir trees, undergrowth of bamboo, juniper, and rhododendron (T105), and by sifting rotting garbage (T109) (Smetana pers. comm.).

Paederus (Megalopaederus) aequilobatus **n. sp.**

(Figs. 6, 25, 44, 62, 123–125, 166–170, 226)

Type material

Holotype ♂: "Taiwan, Pingtung Hsien, Peitawushan, Kuai-Ku Hut, 2125 m, 21.V.1991, A. Smetana [T88] / Holotypus ♂ *Paederus aequilobatus* sp. n., det. V. Assing 2014" (cAss).

Paratype: 1 ♀: same data as holotype (cSme).

Etymology

The specific epithet (Latin, adjective) alludes to the subequal length of the parameres, one of the characters distinguishing this species from most other Taiwanese *Megalopaederus* species with a reddish and microsculptured pronotum.

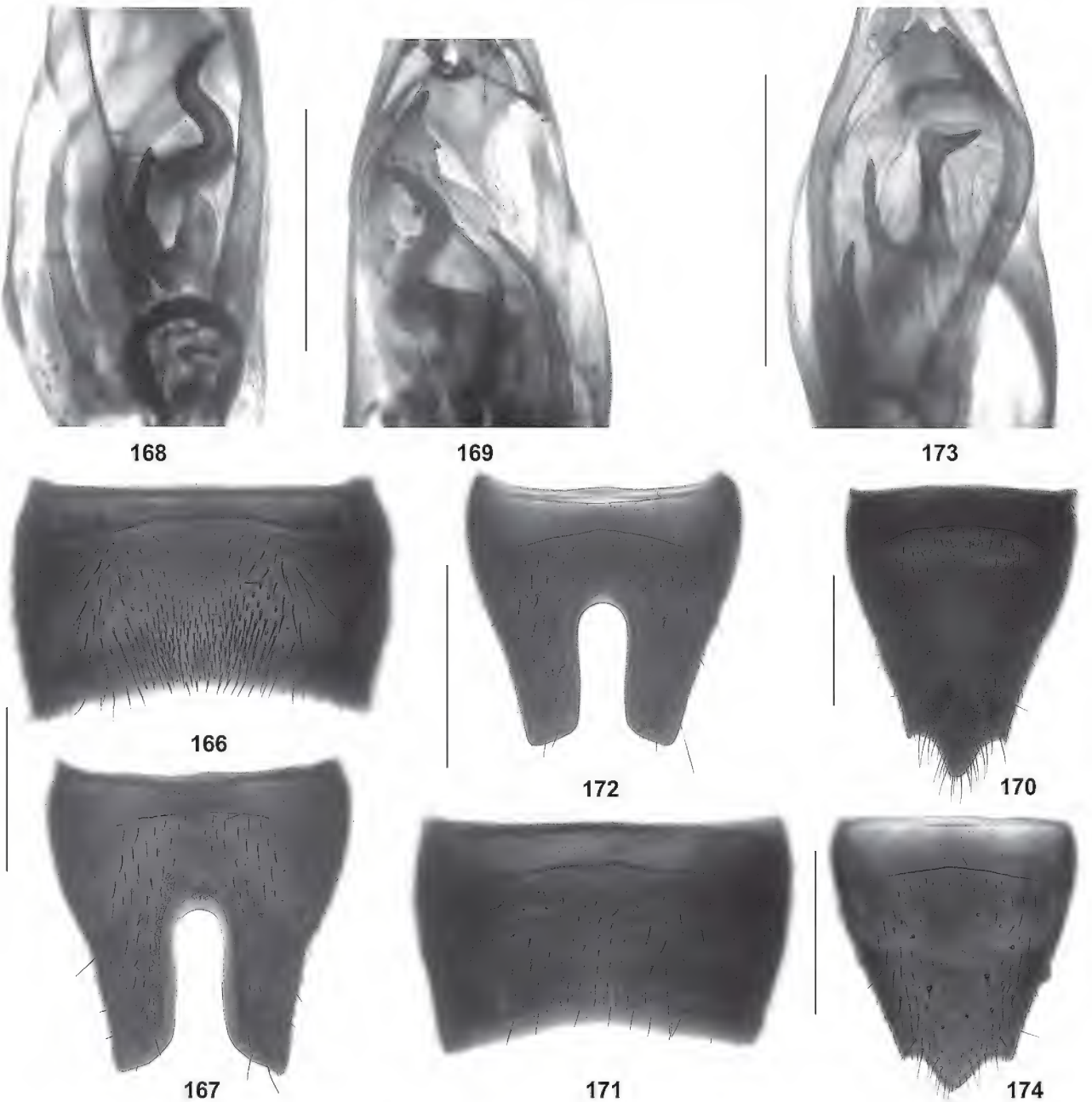
Description

Large and robust species. Body length 12.0–13.0 mm; length of forebody 6.2–6.3 mm. Coloration (Figs. 6, 25, 44, 62): head black; pronotum reddish; elytra black with indistinct bluish hue; abdomen completely black; legs black with dark-brown tarsi; antennae reddish, with apices of antennomeres III–V indistinctly darker at most.

Head (Fig. 6) large, larger and more transverse in male than in female, 1.17 and 1.07 times as broad as long in male and in female, respectively; contours of posterior portion (behind eyes) converging from posterior margin of eyes, strongly convex in male and weakly convex in female in dorsal view; punctation moderately fine and moderately sparse; interstices much broader than diameter of punctures, with pronounced microreticulation rendering the dorsal surface nearly matt. Eyes moderately convex, slightly less than half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 44) 4.4–4.7 mm long and slender, antennomeres IV–VIII approximately three times as long as broad.

Pronotum (Fig. 6) 1.09 times as long as broad, 0.94 times as broad as head in male, and approximately as broad as head in female; strongly convex in cross-section; punctation and microsculpture similar to those of head; midline broadly impunctate.

Elytra (Fig. 6) approximately 0.6 times as long as pronotum and strongly dilated posteriad; humeral angles obsolete; punctation moderately coarse and moderately dense. Hind wings completely reduced. Metatarsomere I slightly shorter than the combined length of II and III.



Figs. 166–174. *Paederus aequilobatus* (166–170) and *P. furcispinosus* (171–174). – **166**, **171**. Male sternite VII. **167**, **172**. Male sternite VIII. **168**, **173**. Internal structures of aedeagus in ventral view. **169**. Internal structures of aedeagus in dorsal view. **170**, **174**. Female sternite VIII. – Scale bars: 1.0 mm.

Abdomen (Fig. 25) approximately 1.2 times as broad as elytra at posterior margin; punctation moderately fine and moderately dense; interstices distinctly broader than diameter of punctures, with pronounced microsculpture composed of transverse meshes; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 166) strongly transverse, with moderately deep impression in postero-median portion, this impression with a cluster of dense short stout setae, posterior margin weakly concave; sternite VIII (Fig. 167) very weakly transverse, posterior excision U-shaped and deep, approximately 0.55 times as deep as length of sternite; tergites IX–X as in Fig. 62; aedeagus (Figs. 123–

125) 2.9 mm long; parameres of subequal length and with rather blunt apices; dorsal plate slightly asymmetric, apically elongated and acute, extending beyond parameral apices; internal sac (Figs. 168–169) with four basal and one dorso-apical sclerotized spines of distinctive shapes, the left basal spine (ventral view) long and weakly curved, the two median basal structures stout and spine-shaped, and the right basal spine massive and shaped like a corkscrew.

♀: sternite VIII (Fig. 170) distinctly oblong, posteriorly with a median process of triangular shape.

Comparative notes

Paederus aequilobatus is readily distinguished from other species with a microsculptured reddish pronotum by its robust body, its coloration (elytra only with indistinct bluish hue; abdomen completely black), and by the morphology of the aedeagus (strongly sclerotized; parameres of subequal length; shapes of dorsal plate and of internal structures; presence of four basal structures).

Distribution and natural history

The type locality is situated in the Peitawushan in Pingtung Hsien (Fig. 226) at an altitude of 2125 m. The distribution overlaps with that of *P. adiectus*. The specimens were collected by sifting layers of accumulated moist leaf litter in a dry stream bed in an original broad-leaved evergreen forest (Smetana pers. comm.).

Paederus (Megalopaederus) furcispinosus **n. sp.**
(Figs. 7, 26, 45, 63, 93–95, 171–174, 227)

Type material

Holotype ♂: "Taiwan: Shanlinhsi, 10.V.1990, Fauchage dans forêt primaire, L. LeSage LL90-41 / Holotypus ♂ *Paederus furcispinosus* sp. n., det. V. Assing 2014" (cSme).

Paratypes: 3 ♀♀: same data as holotype (cSme, cAss); 1 ♂: "Taiwan Nantou Hsien, Shanlinchi, 1650 m 16.V.1990, A. Smetana [T60]" (cAss).

Etymology

The specific epithet is an adjective composed of the Latin noun furca (fork) and the Latin adjective spinosus (spiny). It alludes to the bifurcate right basal spine in the internal sac of the aedeagus.

Description

Slender and relatively small species. Body length 9.5–10.5 mm; length of forebody 4.8–5.2 mm. Coloration (Figs. 7, 26, 45, 63): head black; pronotum pale-reddish (orange); elytra black with pronounced bluish hue; abdomen completely black; legs: femora black with the bases more or less extensively yellowish to yellowish-brown, tibiae and tarsi yellowish to reddish-yellow; antennae reddish-yellow, with antennomeres III–VI(VII) more or less distinctly infuscate.

Head (Fig. 7) approximately 1.1 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, weakly convex in dorsal view; posterior angles practically obsolete; punctation moderately fine and moderately sparse; interstices much broader than diameter of punctures, with moderately distinct microreticulation; dorsal surface with some shine. Eyes strongly convex, slightly more than half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 45) 3.8–4.0 mm long and slender, antennomeres IV–VIII approximately three times as long as broad.

Pronotum (Fig. 7) 1.05–1.10 times as long as broad and approximately as broad as head; strongly convex in cross-section; punctation and microsculpture similar to those of head; dorsal surface with some shine; midline broadly impunctate.

Elytra (Fig. 7) approximately 0.65 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation coarse and moderately dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III.

Abdomen (Fig. 26) approximately 1.2 times as broad as elytra at posterior margin; punctation moderately fine and moderately dense; interstices distinctly broader than diameter of punctures, with moderately pronounced microsculpture composed of transverse meshes, somewhat glossy; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 171) strongly transverse, without distinct postero-median impression and with unmodified pubescence, posterior margin weakly concave; sternite VIII (Fig. 172) moderately transverse, posterior excision U-shaped and deep, approximately 0.55 times as deep as length of sternite; tergites IX–X as in Fig. 63; aedeagus (Figs. 93–95) 2.2–2.3 mm long; parameres of subequal length and apically very acute; ventral process with tridentate apex; dorsal plate slightly asymmetric, apically strongly elongated, acute, and with apex bent to the left (ventral view), extending slightly beyond parameral apices; internal sac (Fig. 173) without dorso-apical spine and with two basal spines of distinctive shapes, the left basal spine (ventral view) strongly sclerotized, moderately long, and bisinuate, the right basal spine asymmetrically bifurcate with the left apex spine-shaped and the right apex larger and conspicuously angled.

♀: sternite VIII (Fig. 174) distinctly oblong, triangular posterior process short and broad.

Comparative notes

This species is characterized by relatively small body size, its coloration (pale-reddish pronotum; black abdo-

men; pale tibiae and tarsi; elytra with pronounced bluish hue), relatively weakly pronounced microsculpture of the head and pronotum, by the unmodified pubescence of the male sternite VII, by the morphology of the aedeagus (strongly sclerotized; parameres of subequal length; distinctive shapes of dorsal plate and internal structures; dorso-apical spine absent), and by the broadly triangular posterior projection of the female sternite VIII.

Distribution and natural history

The type locality (Shanlinhsi = Shanlinchi = Shanlinxi; 23°38′N, 120°48′E) is situated in Nantou Hsien (Fig. 227). One of the paratypes was collected at an altitude of 1650 m. The specimens collected by L. LeSage were swept from vegetation in a primary forest; the specimen collected by A. Smetana was sifted from a thick layer of moist to wet debris, twigs, leaf litter, and old vegetation on bedrock and in depressions of bedrock benches in an original broad-leaved forest (Smetana pers. comm.).

Paederus (Megalopaederus) excisissimus **n. sp.**
(Figs. 8, 27, 46, 64, 96–98, 175–178, 226)

Type material

Holotype ♂: "Taiwan, Pingtung Hsien, Pietawushan [sic] trail at 2000 m 23.V.1991, A. Smetana [T91] / Holotypus ♂ *Paederus excisissimus* sp. n., det. V. Assing 2014" (cAss).

Paratypes: 2 ♀♀: "Taiwan Pingtung Hsien, Peitawushan trail at 1500 m 1.V.1992, A. Smetana [T110]" (cSme, cAss).

Etymology

The specific epithet is the superlative of the Latin adjective excisus (excised) and alludes to the conspicuously deep posterior excision of the male sternite VIII.

Description

Body length 10.5–11.5 mm; length of forebody 5.1–5.4 mm. Coloration (Figs. 8, 27, 46, 64): head black; pronotum bright reddish; elytra black with bluish hue; abdomen black, except for the yellowish anterior portion of the hemitergites IX and tergite X; legs black with brown tarsi; antennae reddish-yellow, with antennomeres III–VI(VII) more or less distinctly infuscate.

Head (Fig. 8) approximately 1.07 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, weakly convex (nearly straight) in dorsal view; posterior angles practically obsolete; punctation fine and sparse; interstices much broader than diameter of punctures, with distinct microreticulation; dorsal surface with reduced shine. Eyes strongly convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 46) 3.8–4.0 mm long and slender, antennomeres IV–VIII approximately three times as long as broad.

Pronotum (Fig. 8) 1.07–1.10 times as long as broad and approximately as broad as head; strongly convex in cross-section; punctation denser and more distinct than that of head; microsculpture similar to that of head; dorsal surface with reduced shine; midline broadly impunctate.

Elytra (Fig. 8) approximately 0.65 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation coarse and moderately dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III.

Abdomen (Fig. 27) approximately 1.2 times as broad as elytra at posterior margin; punctation moderately fine and moderately dense; interstices distinctly broader than diameter of punctures, with pronounced microsculpture composed of transverse meshes, weakly glossy; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

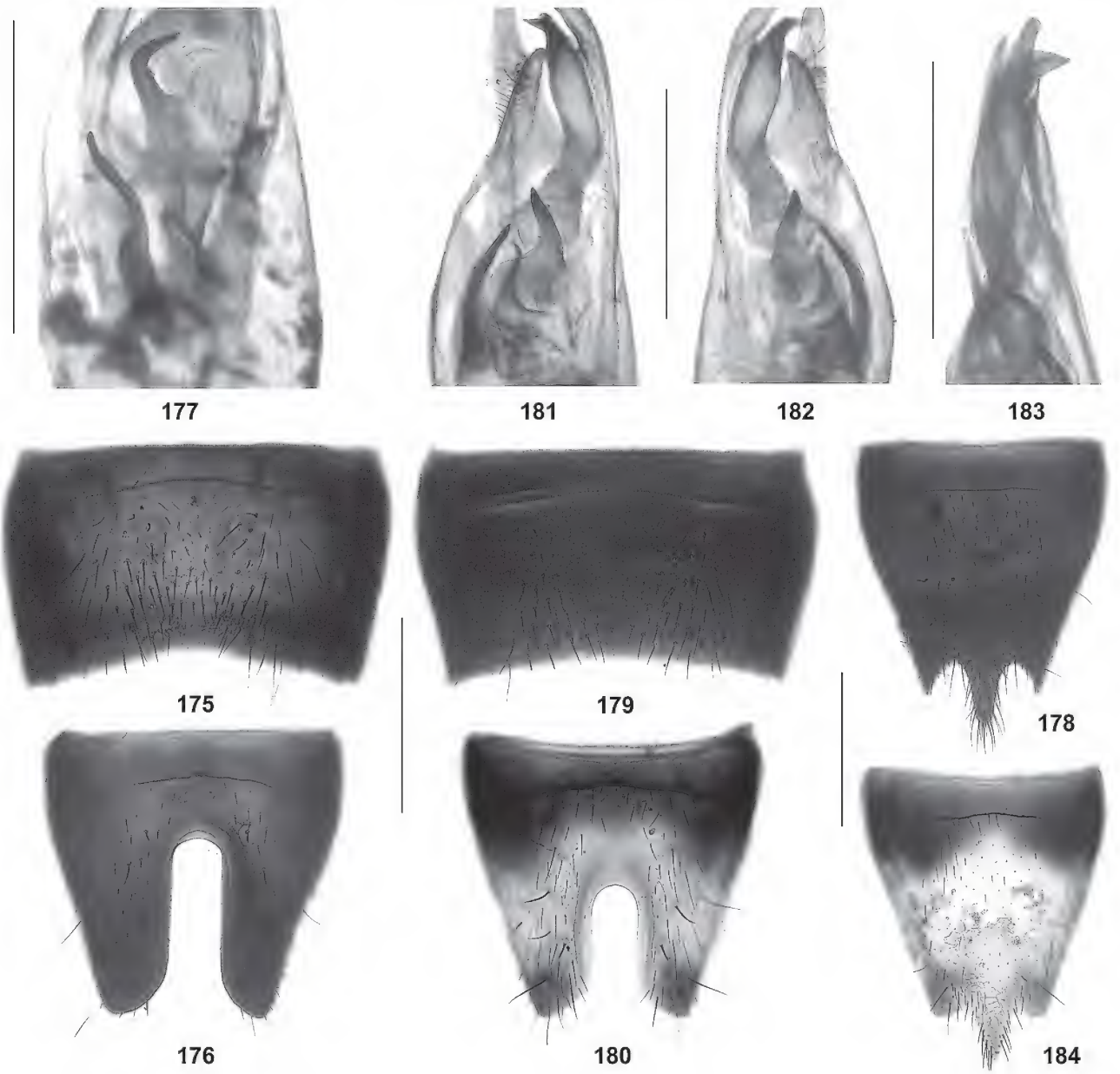
♂: sternite VII (Fig. 175) strongly transverse, without distinct impression in postero-median portion, pubescence unmodified, posterior margin weakly concave; sternite VIII (Fig. 176) distinctly transverse, posterior excision U-shaped and conspicuously deep, 0.62 times as deep as length of sternite; tergites IX–X as in Fig. 64; aedeagus (Figs. 96–98) 2.6 mm long; parameres strongly asymmetric; right paramere slightly longer than left paramere, both parameres acute apically; ventral process apically asymmetric and facing to the right in ventral view; dorsal plate slightly asymmetric, apically strongly elongated and spine-shaped, extending beyond apex of right paramere; internal sac (Fig. 177) without dorso-apical structure and with two basal sclerotized spines of distinctive shapes, the left basal spine (ventral view) moderately long, strongly sclerotized, and bisinuate, the right basal spine rather large and apically extending into a hook-shaped spine.

♀: sternite VIII (Fig. 178) moderately oblong, posterior median projection conspicuously narrow and long.

Comparative notes

From other species of similar size and with a distinctly microsculptured reddish pronotum, *P. excisissimus* is distinguished by the completely black femora and tibiae, by the chaetotaxy of the male sternite VII, by the deep posterior excision of the male sternite VIII, by the morphology of the aedeagus (parameres distinctly asymmetric; shapes of dorsal plate and internal structures; dorso-apical structure absent), and by the long and slender posterior projection of the female sternite VIII. From *P. aequilobatus* and *P. furcispinosus*, which too have the abdominal segments III–VIII completely black, *P. excisissimus* additionally differs by the anteriorly yellowish abdominal segments IX and X.

Some similar derived character states (unmodified chaetotaxy of the male sternite VII; bisinuate left basal



Figs. 175–184. *Paederus excisissimus* (175–178) and *P. formosanus* (179–184; 179–183: holotype, 184: paratype). – **175**, **179**. Male sternite VII. **176**, **180**. Male sternite VIII. **177**, **181**. Internal structures of aedeagus in ventral view. **178**, **184**. Female sternite VIII. **182**. Internal structures of aedeagus in dorsal view. **183**. Apical portion of aedeagus in lateral view. – Scale bars: 1.0 mm.

spine and modified shape of right basal spine in the internal sac of the aedeagus; dorso-apical spine absent) suggest that *P. excisissimus* is most closely allied to *P. furcispinosus*.

Distribution and natural history

The type specimens were collected in two localities along the Peitawushan trail, Pingtung Hsien (Fig. 226), at altitudes of 1500 and 2000 m. They were found by sifting leaf litter, debris, and humus along large fallen trees in an old broad-leaved evergreen forest (T91) and by sifting vegetation, various debris, moss, and fallen leaves in wet areas along a forest trail (T110) (SMETANA pers. comm.).

Paederus (Megalopaederus) alutithorax Bernhauer, 1943
(Fig. 226)

Paederus alutithorax BERNHAUER 1943: 176 f.

Type material examined

Holotype ♀: "Rantaizan, 20.V.1928, Col. J. Sonan / *alutithorax* Brnh. Typus un. *Paederus* / *alutithorax* Brnh. n. sp. / *Paederus alutithorax* Bernhauer, det. V. Assing 2014" (FMNH).

Comment

The original description is based on a unique specimen ("Ein Stück") from "Formosa: Rantaizan" (= Beiluanda Shan = Luan-ta Shan; 23°43′N, 120°57′E) (Bernhauer 1943). The holotype is unfortunately a female in rather poor condition.

Redescription

Body length 10.2 mm; length of forebody 5.4 mm. Coloration: forebody black, elytra with bluish hue; abdomen: segments III–VII black, segment VIII and tergite X pale-yellowish, hemitergites IX yellowish, with the posterior processes somewhat infuscate; legs: femora black, tibiae and tarsi yellowish; antennae yellowish-red.

Head 1.05 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, weakly convex (nearly straight) in dorsal view; posterior angles obsolete; punctation moderately fine and sparse, sparser in anterior and median dorsal portions; interstices much broader than diameter of punctures, with pronounced microreticulation; dorsal surface nearly matt. Eyes moderately convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna 4.0–4.2 mm long, antennomeres IV–VIII more than twice as long as broad.

Pronotum 1.09 times as long as broad and approximately as broad as head; strongly convex in cross-section; punctation slightly more distinct than that of head; microreticulation similar to that of head; midline broadly impunctate.

Elytra short, 0.67 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation coarse and rather dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III.

Abdomen with fine and rather sparse punctation; interstices distinctly broader than diameter of punctures, with pronounced microsculpture composed of transverse striae; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: unknown.

♀: sternite VIII oblong, of similar shape as in the following species.

Comparative notes

For characters distinguishing *P. alutithorax* from other species of similar coloration see the comparative notes in the following sections and the key to species (section 3.4).

Distribution and natural history

The Beiluanda Shan (23°43′N, 120°57′E) is situated in Nantou Hsien (Fig. 226). Additional data are not available.

Paederus (Megalopaederus) formosanus Adachi, 1939
(Figs. 9, 28, 47, 65, 99–101, 179–184, 226)

Paederus formosanus Adachi 1939: 166.

Type material examined

Holotype ♂: "Mt. Rara, Bunzan-Gun, North-Formosa, 18–20-June-1938. Coll. Sizumu Nomura / ♂ / Holotype / *Paederus formosanus* Adachi, det. T. Adachi / *Paederus formosanus* Adachi, det. V. Assing 2014" (cOhn). – Paratypes: 1 ♀: same data as holotype (cOhn); 1 ♀: same data as holotype, but "Coll. Hiroshi Inoue" (cOhn).

Additional material examined

Taiwan: 1 ♂, same data as holotype, but labelled as "Metatype" (cOhn); 1 ♂, Hsuan-yuan ["Kayahara"; 24°38′N, 121°23′E], 23–24.VI.1941, leg. Sâto (cOhn); 1 ♀, Taoyuan, Lala Shan, Takuanshan Forest, 1650 m, 17.IV.1990, leg. Smetana [T5] (cAss).

Comment

The original description is based on a male holotype and two paratypes from "Formosa: Mt. Rara" (= Lala Shan; 24°45′N, 121°25′E) (Adachi 1939). According to the description, the type material is deposited in the Adachi collection. Shuhei Nomura kindly informed me that it is currently in the private collection of Masao Ohno.

Redescription

Body length 9.5–10.5 mm; length of forebody 4.9–5.2 mm. Coloration (Figs. 9, 28, 47, 65): forebody black, elytra with weak bluish hue; abdomen: segments III–VII black, segment VIII yellowish with the anterior and posterior portions blackish, hemitergites IX anteriorly yellowish and posteriorly infuscate, tergite X yellowish; legs black with reddish tarsi; antennae reddish.

Head (Fig. 9) 1.08–1.11 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, weakly convex in dorsal view; posterior angles obsolete; punctation moderately fine and sparse, sparser in anterior and median dorsal portions; interstices much broader than diameter of punctures, without microreticulation and distinctly glossy. Eyes moderately convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 47) approximately 3.5 mm long, antennomeres IV–VIII slightly more than twice as long as broad.

Pronotum (Fig. 9) approximately 1.12 times as long as broad and approximately 0.9 times as broad as head; strongly convex in cross-section; punctation very sparse, as fine as that of head; interstices without microsculpture and glossy; midline broadly impunctate.

Elytra (Fig. 9) 0.55–0.60 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation rather coarse and moderately dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III.

Abdomen (Fig. 28) with fine and rather sparse punctation; interstices much broader than diameter of punctures, with fine transverse microsculpture; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 179) strongly transverse, without distinct impression in postero-median portion, pubescence unmodified; sternite VIII (Fig. 180) distinctly transverse, posterior incision approximately 0.5 times as deep as length of sternite; tergites IX–X as in Fig. 65; aedeagus (Figs. 99–101) 2.4–2.5 mm long; parameres distinctly asymmetric; right paramere (ventral view) much longer than left paramere and apically strongly curved; both parameres with blunt apices; ventral process apically asymmetric, obliquely convex; dorsal plate narrowly wedge-shaped in dorsal view, apically nearly extending to apex of right paramere; internal sac (Figs. 181–183) with three basal sclerotized spines of different shapes and with a long and massive, apically hooked dorso-apical spine.

♀: sternite VIII (Fig. 184) oblong, posterior triangular projection rather long and slender.

Comparative notes

Among the *Megalopaederus* species known from Taiwan with a black pronotum and without microsculpture on the head and pronotum, *P. formosanus* is characterized particularly by the coloration of the legs and the abdominal apex, the relatively slender pronotum, and by the derived morphology of the aedeagus (shapes of parameres, dorsal plate, and internal structures). For additional characters see the comparative notes in the section on *P. alesi*.

Distribution and natural history

Paederus formosanus is currently known from few localities in northern Taiwan (Fig. 226). The specimens were collected in April, May, and June. One of the specimens from the Lala Shan (T5) was collected by sifting debris and humus among lush vegetation in an original mixed forest with mostly broad-leaved evergreen trees (Smetana pers. comm.) at an altitude of 1650 m, together with the type specimens of *P. trihamatus*.

Paederus (Megalopaederus) trihamatus **n. sp.**
(Figs. 10, 29, 48, 66, 102–104, 185–188, 227)

Type material

Holotype ♂: "Taiwan Taoyuan Hsien, Takuanshan [= Lala Shan; 24°45′N, 121°25′E] For. 17.IV.90 1650 m, A. Smetana [T5] / Holotypus ♂ *Paederus trihamatus* sp. n., det. V. Assing 2014" (cAss).

Paratype: 1 ♀: same data as holotype (cSme).

Etymology

The specific epithet (Latin, adjective: with three hooks) alludes to the shapes of the three internal spines of the aedeagus.

Description

Body length 10.5–11.2 mm; length of forebody 5.1–5.4 mm. Coloration (Figs. 10, 29, 48, 66): forebody black, elytra with pronounced bluish hue; abdomen: segments III–VII black, segment VIII yellowish, segment IX yellowish with the posterior processes indistinctly infuscate (dark-yellowish), tergite X yellowish; legs with black femora and dark-yellowish tibiae and tarsi; antennae yellowish-red.

Head (Fig. 10) 1.09 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, weakly convex in dorsal view; posterior angles obsolete; punctation moderately fine and sparse, sparser in anterior and median dorsal portions; interstices much broader than diameter of punctures, with microreticulation, but with some shine. Eyes moderately convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 48) 3.6–3.8 mm long, antennomeres IV–VIII slightly more than twice as long as broad.

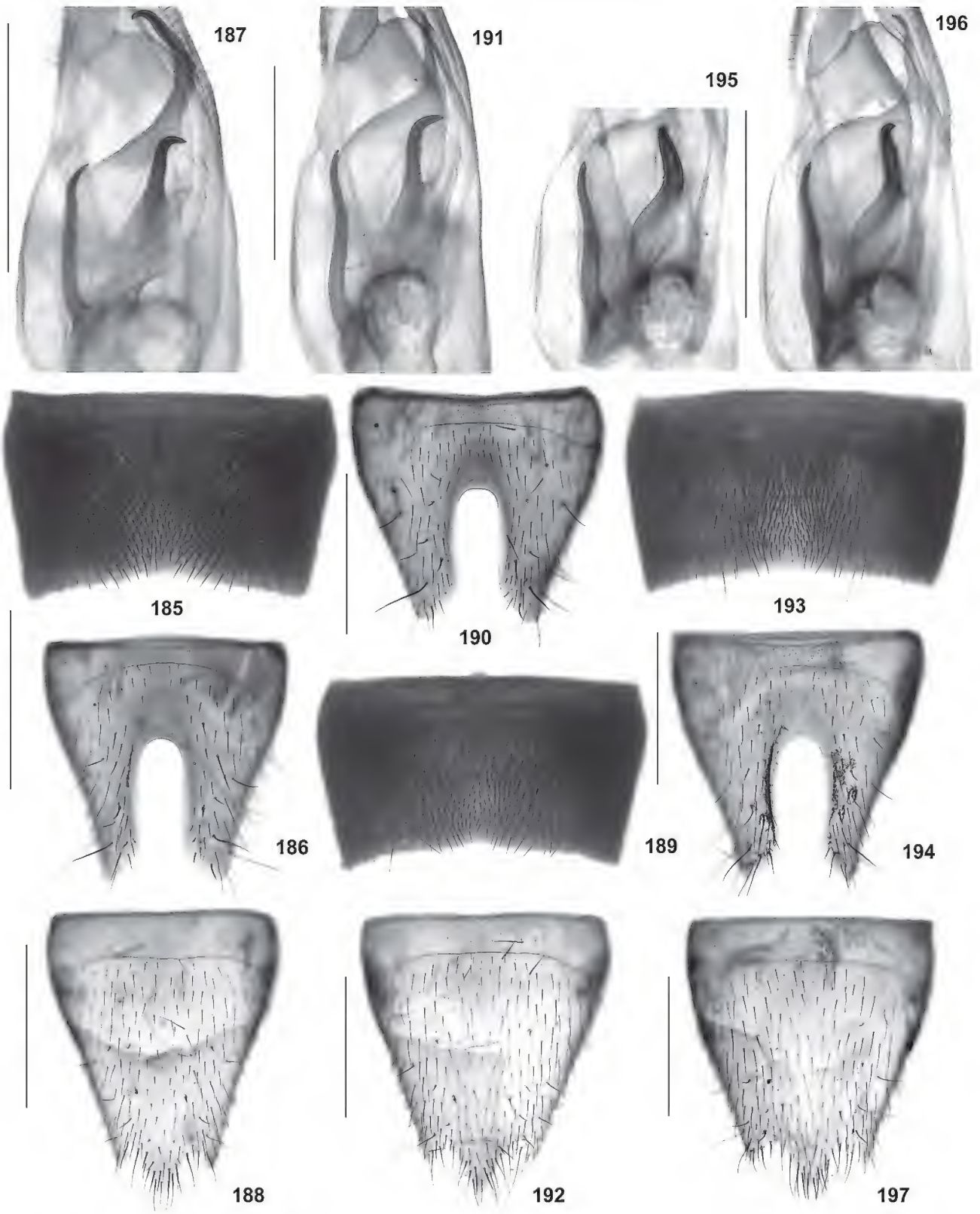
Pronotum (Fig. 10) 1.08–1.10 times as long as broad and 0.97–1.10 times as broad as head; strongly convex in cross-section; punctation similar to that of head; microsculpture similar to that of head or shallower; midline broadly impunctate.

Elytra (Fig. 10) approximately 0.65 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation rather coarse and moderately dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III.

Abdomen (Fig. 29) with moderately fine and moderately dense punctation; interstices broader than diameter of punctures, with fine transverse microsculpture; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 185) strongly transverse, with rather shallow impression in postero-median portion, this impression with a cluster of dense moderately short setae; sternite VIII (Fig. 186) approximately as broad as long, posterior incision 0.55 times as deep as length of sternite; tergites IX–X as in Fig. 66; aedeagus (Figs. 102–104) 2.2 mm long; parameres weakly asymmetric, of equal length, and apically moderately acute; ventral process apically truncate and weakly notched on the left (ventral view); dorsal plate of elongate triangular shape, apically extending into an asymmetric hook facing to the left (ventral view), and extending beyond apices of parameres; internal sac (Fig. 187) with two apically hooked basal sclerotized spines of different shapes and with long medially angled and apically hooked dorso-apical spine.

♀: sternite VIII (Fig. 188) oblong, posterior triangular projection moderately long and apically convex.



Figs. 185–197. *Paederus trihamatus* (185–188), *P. bivirgatus* (189–192), and *P. anmamontis* (193–197). – **185**, **189**, **193**. Male sternite VII. **186**, **190**, **194**. Male sternite VIII. **187**, **191**, **195–196**. Internal structures of aedeagus in ventral view. **188**, **192**, **197**. Female sternite VIII. – Scale bars: 1.0 mm.

Comparative notes

Among the species with a black and microsculptured pronotum, *P. trihamatus* is most similar to *P. bivirgatus* (see the following section). It differs from the similar *P. alutithorax* by the less pronounced microsculpture of the head and pronotum, the more pronounced bluish hue of the elytra, and the less distinctly infuscate posterior processes of the hemitergites IX. From the sympatric and syntopic *P. formosanus*, the new species is distinguished by the broader and distinctly microsculptured pronotum, the coloration of the tibiae and the abdominal segments VIII and IX, the more pronounced bluish hue of the elytra, the less transverse male sternites VII and VIII, and by the completely different morphology of the aedeagus.

Distribution and natural history

The type locality is situated in the Lala Shan, Taoyuan Hsien, northern Taiwan (Fig. 227). The specimens were collected by sifting debris and humus among lush vegetation in an original mixed forest with mostly broad-leaved evergreen trees (Smetana pers. comm.) at an altitude of 1650 m, together with a female of *P. formosanus*.

Paederus (Megalopaederus) bivirgatus **n. sp.**
(Figs. 11, 30, 49, 67, 126–128, 189–192, 226)

Type material

Holotype ♂: "Taiwan Hualien Hsien, Taroko N. P., Nanhushi Hut, 2220 m 12.V.1990, A. Smetana [T54] / Holotypus ♂ *Paederus bivirgatus* sp. n., det. V. Assing 2014" (cSme).

Paratypes: 1♂, 1♀: same data as holotype, but "8.V.1990 … [T48]" (cAss); 1 ♀: "Taiwan Hualien Hsien, Taroko N. P., Nanhunanfong trl. (west) 2700 m 9.V.90, A. Smetana [T49]" (cSme); 1 ♀: "Taiwan Hualien Hsien, Taroko N. P., Chungyangtienshi (Riv.) Waterfall, 2300 m 10.V.1990, A. Smetana [T50]" (cSme); 1 ♀: "Taiwan Hualien Hsien, Taroko N. P., Chungyangtienshi (Riv.) Waterfall, 2280 m 10.V.1990, A. Smetana [T51]" (cSme).

Etymology

The specific epithet (Latin, adjective: with two rods) alludes to the shapes of the two basal internal spines of the aedeagus.

Description

Body length 10.0–11.8 mm; length of forebody 5.3–5.7 mm. Coloration (Figs. 11, 30, 49, 67): forebody black, elytra with moderate violet-bluish hue; abdomen: segments III–VII black, segment VIII yellowish, segment IX yellowish with the posterior processes indistinctly infuscate (dark-yellowish), tergite X yellowish; legs with black femora and reddish to reddish-brown tibiae and tarsi; antennae reddish.

Head (Fig. 11) approximately 1.12–1.15 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, weakly to distinctly convex in dorsal view; posterior angles mostly obsolete, rarely weakly indicated; punctation moderately fine and sparse, sparser in anterior and median dorsal portions; interstices much broader than diameter of punctures, with more or less pronounced microreticulation, but with some shine. Eyes distinctly convex, slightly more than half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 49) approximately 3.5–3.6 mm long, antennomeres IV–VIII slightly more than twice as long as broad.

Pronotum (Fig. 11) 1.04–1.05 times as long as broad and 1.01–1.04 times as broad as head; strongly convex in cross-section; punctation and microsculpture similar to those of head; midline broadly impunctate.

Elytra (Fig. 11) approximately 0.65–0.68 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation rather coarse and moderately dense. Hind wings completely reduced. Metatarsomere I mostly slightly shorter than, more rarely as long as, the combined length of II and III.

Abdomen (Fig. 30) with moderately fine and moderately dense punctation; interstices broader than diameter of punctures, with fine transverse microsculpture; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 189) strongly transverse, with rather shallow impression in postero-median portion, this impression with a cluster of dense moderately short setae; sternite VIII (Fig. 190) moderately transverse, posterior incision approximately 0.58 times as deep as length of sternite; tergites IX–X as in Fig. 67; aedeagus (Figs. 126–128) approximately 2.5 mm long; parameres moderately asymmetric, right paramere (ventral view) longer than left paramere; both parameres apically moderately acute; ventral process apically truncate; dorsal plate strongly elongated and sclerotized apically, extending into an asymmetric hook facing to the left (ventral view), and extending slightly beyond apex of right paramere; internal sac (Fig. 191) with two long basal sclerotized spines of different lengths and shapes, and with apically slender and nearly straight dorso-apical spine.

♀: sternite VIII (Fig. 192) oblong, posterior triangular projection moderately long and apically acute.

Comparative notes

Paederus bivirgatus differs from the similar *P. trihamatus* by the less oblong and broader pronotum, the less pronounced and more violet hue of the elytra, the slightly darker tibiae and tarsi, the more transverse male sternite VIII, and by the morphology of the aedeagus (shape of ventral process; parameres of different lengths; apically more elongated and more slender dorsal plate; shapes of internal structures).

Distribution and natural history

The known distribution is confined to some localities in the Taroko National Park in Hualien, eastern Taiwan (Fig. 226). The specimens were collected at altitudes of 2220–2700 m. They were sifted from leaf litter, rotting wood, and bark along large fallen and standing trees in an old coniferous forest (T48), from rotting mushrooms and debris in a secondary pine forest with high grass undergrowth (T49), from moist to wet debris and leaf litter in an area permanently sprinkled with water near a waterfall (T50), from debris, leaf litter, and moss in the moist to wet inundated zone of a river with young broad-leaved trees (T51), and from moist to wet vegetation close to water, moss on large rocks, and flood debris near a stream in a mixed forest (T54) (SMETANA pers. comm.).

Paederus (Megalopaederus) anmamontis **n. sp.**
(Figs. 12, 31, 50, 68, 105–107, 193–197, 226)

Type material

Holotype ♂: "Taiwan Taichung Hsien, Anmashan, 2225 m 2.V.1990, A. SMETANA [T37] / Holotypus ♂ *Paederus anmamontis* sp. n., det. V. ASSING 2014" (cSme).

Paratypes: 6♂♂: same data as holotype (cSme, cAss); 1 ♀: "Taiwan Taichung Hsien, Anmashan, 2230 m 30.IV.–4.V.90, A. SMETANA [T32]" (cSme); 1 ♂ [teneral]: "Taiwan Taichung Hsien, Anmashan, 2120 m 1.V.1990, A. SMETANA [T35]" (cSme); 1 ♂: "Taiwan Taichung Hsien, Anmashan, 2225 m 2.V.1990, A. SMETANA [T38]" (cSme); 2♂♂: "Taiwan Taichung Hsien, Anmashan, 2230 m 4.V.1990, A. SMETANA [T43]" (cSme, cAss); 1 ♂, 2 ♀♀: "Taiwan, Taichung Hsien, Anmashan, Creek, 2135 m, 12.V.92, A. SMETANA [T125]" (cSme, cAss); 1 ♂: "Taiwan, Taichung Hsien, Anmashan, 2230 m, 12.V.92, A. SMETANA [T127]" (cAss); 3♂♂, 7♀♀: "Taiwan: Anmashan Cottage, 1.V.1990, 2235 m. Forêt primaire. L. LESAGE" (cSme, cAss); 1 ♂: "Taiwan: Anmashan, Taichung Hsien. 2235 m. 2.V.1990. For. primaire. L. LESAGE LL90-34" (cSme); 5♂♂, 6♀♀: "Taiwan: Anmashan, Taichung Hsien. 2100–2135 m. Fauch. forêt primaire. [date not indicated, probably 2.V.1990 or 3.V.1990] L. LESAGE LL90-35" (cSme, cAss); 4♂♂, 4♀♀: "Taiwan: Anmashan, Taichung Hsien. 2100 m. Route second. km 34. [date not indicated, probably 2.V.1990 or 3.V.1990] L. LESAGE LL90-36" (cSme, cAss); 3♀♀: "Taiwan: Anmashan, Taichung Hsien. 2100 m. km 38. Bord route. L. LESAGE LL90-37 / Date: 3.V.1990" (cSme, cAss); 1 ♂: "Taiwan: Anmashan, Taichung Hsien 2600–2690 m. 4.V.1990. Route for abandonnée, L. LESAGE LL90-39 / Dans excréements humains" (cAss); 1 ♂, 2♀♀: "Taiwan: Taichung, Anmachan [sic], 2000 m, 8.IV.2002, leg. H. SUGAYA" (MNHUB); 1 ♀: "Taiwan: Tai, Chung Lo, An Ma Shan, 2 km [sic], 24–26.VI.2003, Flight intercept trap, leg. CHUN LIN LI" (MNHUB).

Etymology

The specific epithet is a noun composed of the name of the mountain where the species was discovered and of the genitive of the Latin noun mons (mountain).

Description

Body length 10.5–12.5 mm; length of forebody 5.4–6.1 mm. Coloration (Figs. 12, 31, 50, 68): forebody black, elytra with distinct bluish hue; abdomen: segments III–VII black, segment VIII yellowish, segment IX yellowish with the posterior processes indistinctly infuscate (dark-yellowish), tergite X yellowish; legs black with the tarsi and the apical portion of the tibiae more or less extensively yellowish to reddish; antennae reddish.

Head (Fig. 12) approximately 1.05 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, distinctly convex in dorsal view; posterior angles mostly obsolete, rarely weakly indicated; punctation moderately coarse and moderately sparse, sparser in anterior and median dorsal portions; interstices broader than diameter of punctures; microreticulation pronounced, rendering dorsal surface nearly matt. Eyes moderately convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 50) 3.9–4.3 mm long, antennomere IV nearly three times as long as broad, V–VIII more than twice as long as broad.

Pronotum (Fig. 12) 1.04–1.08 times as long as broad and 1.01–1.05 times as broad as head; strongly convex in cross-section; punctation and microsculpture similar to those of head; midline broadly impunctate.

Elytra (Fig. 12) 0.60–0.65 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation rather coarse and moderately dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III, or nearly so.

Abdomen (Fig. 31) with moderately fine and moderately dense punctation; interstices broader than diameter of punctures, with fine transverse microsculpture; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 193) strongly transverse, with extensive impression in postero-median portion, this impression with numerous short stout setae; sternite VIII (Fig. 194) weakly transverse, posterior incision approximately 0.58 times as deep as length of sternite; tergites IX–X as in Fig. 68; aedeagus (Figs. 105–107) 2.6–2.8 mm long; parameres moderately asymmetric, right paramere (ventral view) longer than left paramere; both parameres apically moderately acute; ventral process apically weakly bisinuate; dorsal plate of narrowly and asymmetrically triangular shape, apically extending into an asymmetric hook facing to the left (ventral view), and extending slightly beyond apex of right paramere; internal sac (Figs. 195–196) with two long basal sclerotized spines of different lengths and shapes, and with apically slender and nearly straight dorso-apical spine.

♀: sternite VIII (Fig. 197) oblong, posterior triangular projection moderately long and apically acute.

Comparative notes

Among the species with a black microsculptured pronotum, *P. anmamontis* is characterized particularly by

large body size, the pronounced microsculpture of the head and pronotum, the coloration of the tibiae, the distinctly modified chaetotaxy of the male sternite VII, and by the morphology of the aedeagus (shapes of ventral process, dorsal plate, and internal structures).

Distribution and natural history

The known distribution is confined to the Anmashan (24°16′N, 121°01′E) in Taichung Hsien (Fig. 226). The altitudes range from 2000 to 2690 m. The specimens collected by A. Smetana were caught with pitfall traps baited with chicken droppings in a broad-leaved evergreen forest (T32) and sifted from moist to wet debris and leaf litter along a small overgrown stream (T35), from layers of green leaves, wet debris, and small branches (T37), various moist debris along large fallen trees and around bases of standing trees (T38), and wet leaf litter, debris, and moss between large rocks on the forest floor (T43) in original mixed forests, from old vegetation, debris, humus, and moss among lush dense vegetation in a deep stream valley in an old mixed forest (T125), and from leaf litter, piles of twigs, and various other debris accumulated around stumps of huge trees in an old broad-leaved evergreen forest (T127) (Smetana pers. comm.). Two specimens collected by Chun Lin Li and L. LeSage were caught with a flight interception trap and found in human faeces, respectively. All the other specimens found by L. LeSage were swept from vegetation in a primary forest and along roads (Smetana pers. comm.). The type material was collected in April and May. One specimen (May) is teneral.

Paederus (Megalopaederus) semiflavus **n. sp.**
(Figs. 13, 32, 51, 69, 132–134, 198–200, 227)

Type material

Holotype ♂: "Taiwan, Taitung County, Yakou Country Inn, N23°16.063 E120°58.419, 2582 m, by hand, 11.viii.2008, H. Mendel & MVL Barclay, BMNH(E) 2008-85 / Holotypus ♂ *Paederus semiflavus* sp. n., det. V. Assing 2014" (BMNH).

Paratype ♂ [infested with Laboulbeniales]: same data as holotype (cAss).

Etymology

The specific epithet (Latin, adjective: half-yellow) alludes to the coloration of the abdominal segment VIII.

Description

Body length 10.5–12.0 mm; length of forebody 5.4–5.5 mm. Coloration (Figs. 13, 32, 51, 69): forebody black, elytra with distinct bluish hue; abdomen: segments III–VII black, tergite VIII yellowish, with the anterior and posterior portions more or less extensively blackish, sternite VIII blackish in anterior third and yellowish in posterior two-thirds, hemitergites IX yellowish in anterior half and blackish in posterior half, sternite IX somewhat infuscate (brownish); legs black with yellowish-brown to dark-reddish tarsi; antennae reddish.

Head (Fig. 13) 1.12 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, moderately convex in dorsal view; posterior angles obsolete; punctation moderately fine and moderately sparse; interstices broader than diameter of punctures; microreticulation pronounced, rendering dorsal surface nearly matt. Eyes moderately convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 51) 3.7–3.9 mm long, antennomeres IV–VIII slightly more than twice as long as broad.

Pronotum (Fig. 13) 1.07–1.12 times as long as broad and 0.96–0.98 times as broad as head; strongly convex in cross-section; punctation and microsculpture similar to those of head; midline broadly impunctate.

Elytra (Fig. 13) 0.60–0.65 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation rather coarse and moderately dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III, or nearly so.

Abdomen (Fig. 32) with moderately fine and moderately dense punctation; interstices broader than diameter of punctures, with fine transverse microsculpture; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 198) moderately strongly transverse, with shallow impression in postero-median portion, this impression with moderately dense and weakly modified setae; sternite VIII (Fig. 199) moderately transverse, posterior incision approximately 0.55 times as deep as length of sternite; tergites IX–X as in Fig. 69; aedeagus (Figs. 132–134) 2.5–2.6 mm long; parameres strongly asymmetric, right paramere (ventral view) distinctly longer than left paramere; both parameres apically moderately acute; ventral process apically concave; dorsal plate asymmetric, elongated, and apically hooked, extending slightly beyond apex of right paramere; internal sac (Fig. 200) with two basal sclerotized spines, the left spine long and slender and the right spine shorter and stouter, and one dorso-apical spine of characteristic shape.

♀: unknown.

Comparative notes

Among the species with a black microsculptured pronotum, *P. semiflavus* is characterized particularly by the coloration of the abdominal segment VIII and by the morphology of the aedeagus (shapes of ventral process, parameres, dorsal plate, and internal structures).

Distribution and natural history

The type locality is situated in Taitung Hsien, southeastern Taiwan (Fig. 227), at an altitude of nearly 2600 m. The paratype is infested with Laboulbeniales.

Paederus (Megalopaederus) alesi **n. sp.**
(Figs. 14, 33, 52, 70, 129–131, 201–203, 226)

Type material

H o l o t y p e ♂: "Taiwan Hualien Hsien, Taroko N. P., Duodyatunshan, 2650 m 8–13.V.90, A. SMETANA [T57] / Holotypus ♂ *Paederus alesi* sp. n., det. V. ASSING 2014" (cAss).

Etymology

It is with great pleasure that I dedicate this distinctive species to ALEŠ SMETANA, who, with his scientific merits and amazing material, has contributed so much to the present knowledge of the Staphylinidae of Taiwan.

Description

Large and robust species with a conspicuously large head. Body length 12.0 mm; length of forebody 6.0 mm. Coloration (Figs. 14, 33, 52, 70): forebody black; abdomen: segments III–VII black, tergite VIII with the anterior portion and the apex blackish, sternite VIII with the anterior half blackish and the posterior half yellowish, hemitergites IX yellowish in anterior half and infuscate in posterior half, tergite X yellowish; legs black with reddish tarsi; antennae reddish.

Head (Fig. 14) conspicuously large and transverse, 1.18 times as broad as long; somewhat dilated behind eyes and with moderately marked posterior angles in dorsal view; punctation fine and sparse, sparser in anterior and median dorsal portions; interstices much broader than diameter of punctures, without microsculpture and glossy. Eyes small and moderately convex, approximately one-third as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 52) 3.9 mm long, antennomeres IV–IX slightly more than twice as long as broad.

Pronotum (Fig. 14) 1.05 times as long as broad and 0.95 times as broad as head; strongly convex in cross-section; punctation similar to that of head; midline broadly impunctate; interstices without trace of microsculpture and glossy.

Elytra (Fig. 14) very short, approximately 0.50 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation rather fine and sparse; interstices with microsculpture and subdued shine. Hind wings completely reduced. Metatarsomere I slightly shorter than the combined length of II and III.

Abdomen (Fig. 33) with very fine and rather sparse punctation; interstices broader than diameter of punctures, with fine transverse microsculpture; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 201) conspicuously transverse, without distinct impression in postero-median portion, pubescence not distinctly modified; sternite VIII (Fig. 202) distinctly transverse, posterior incision very deep, approximately 0.50 times as deep as length of sternite; tergites IX–X as in Fig. 70; aedeagus approximately 2.75 mm long; parameres asymmetric, right paramere (ventral view) much longer than left paramere; both parameres apically acute; ventral process apically strongly convex; dorsal plate narrowly wedge-shaped and apically acute, extending beyond apex of right paramere; internal sac (Fig. 203) with four distinctly sclerotized basal spines of different shapes and with dorso-apical structure of distinctive shape.

♀: unknown.

Comparative notes

Among the *Megalopaederus* species known from Taiwan, *P. alesi* is highly distinctive and characterized by a large and robust body, the large and strongly transverse head, the coloration, the absence of microsculpture on the head and pronotum, the microsculptured and practically matt elytra, the absence of the bluish hue on the elytra, the conspicuously transverse male sternite VII without distinctly modified pubescence, and by the conspicuous morphology of the aedeagus (parameres of very different lengths; shape of dorsal plate; number and shapes of internal structures).

Distribution and natural history

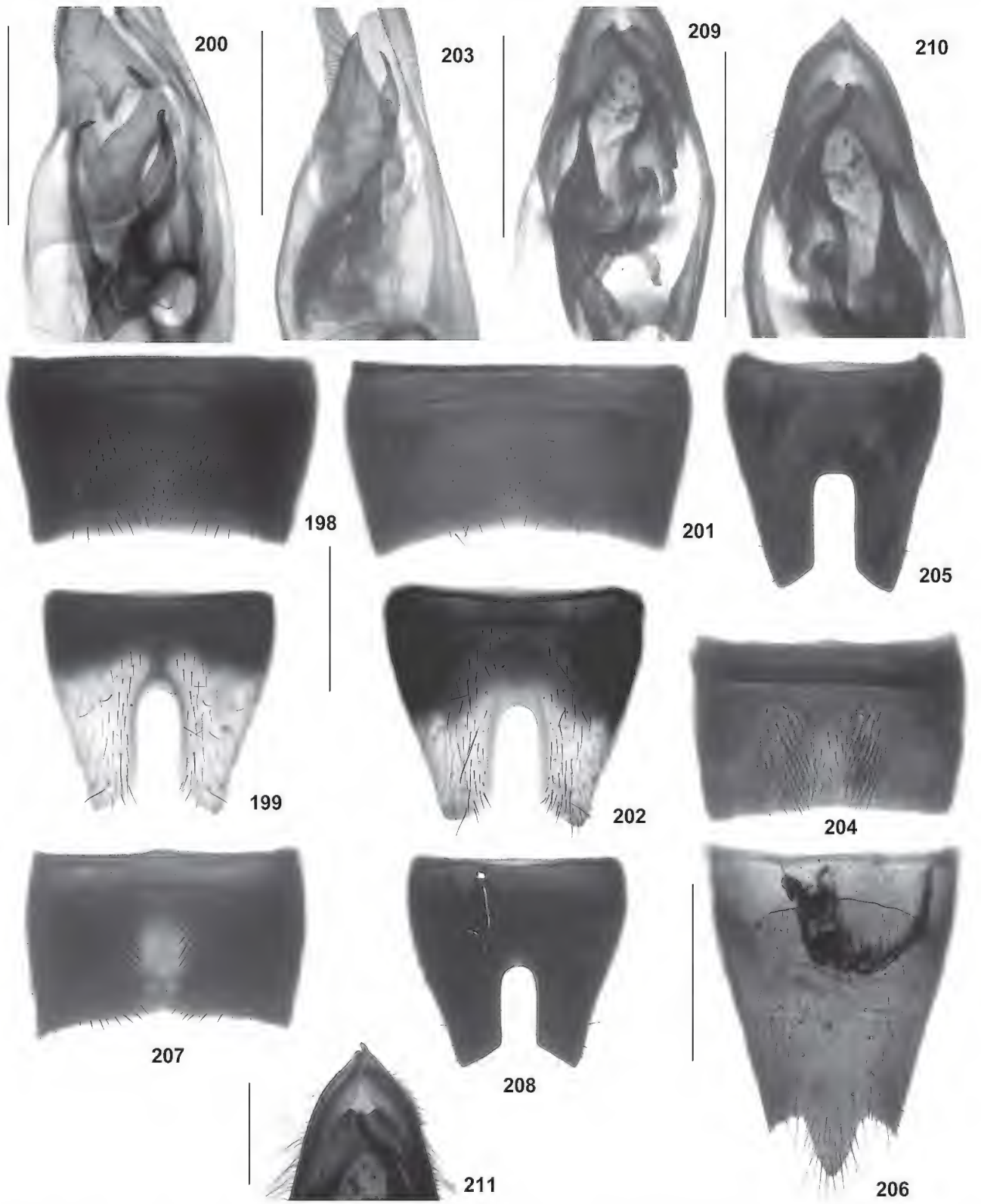
The type locality is situated in the Taroko National Park in Hualien, eastern Taiwan (Fig. 226). The holotype was collected with an unbaited pitfall trap in a coniferous forest (SMETANA pers. comm.) at an altitude of 2650 m.

Paederus (Megalopaederus) kosempoensis Bernhauer, 1922
(Figs. 15, 34, 53, 71, 108–110, 204–206, 228)

Paederus kosempoensis BERNHAUER 1922: 228.

Type material examined

L e c t o t y p e ♂ [dissected prior to present study; internal sac and dorsal parts of aedeagus missing], present designation: "Kosempo (Formosa), H. SAUTER. 1911 / *kosempoensis* Bernh. Cotypus. / Chicago NHMus, M. BERNHAUER Collection / Lectotypus ♂ *Paederus kosempoensis* Bernhauer, desig. V. ASSING 2014 / *Paederus kosempoensis* Bernhauer, det. V. ASSING" (FMNH). – P a r a l e c t o t y p e ♀: "Kosempo (Formosa), H. SAUTER. 1911 / 22.VII. / *kosempoensis* Bernh. Typus. / Chicago NHMus, M. BERNHAUER Collection" (FMNH).



Figs. 198–211. *Paederus semiflavus* (198–200), *P. alesi* (201–203), *P. kosempoensis* (204–206), and *P. discurrens* (207–211). – **198**, **201**, **204**, **207**. Male sternite VII. **199**, **202**, **205**, **208**. Male sternite VIII. **200**, **203**, **209**. Internal structures of aedeagus in ventral view. **206**. Female sternite VIII. **210**. Internal structures of aedeagus in dorsal view. **211**. Apical portion of aedeagus in ventral view. – Scale bars: 1.0 mm (198–210), 0.5 mm (211).

Comment

The original description is based on an unspecified number of syntypes from "Kosempo" (today Chia-hsien or Jiaxian; 23°05′N, 120°35′E) (Bernhauer 1922). Two syntypes, a male and a female, were located in the Bernhauer collection at the FMNH. The male, whose aedeagus is in poor condition, is designated as the lectotype.

Redescription

Species of relatively slender habitus. Body length 9.5–11.0 mm; length of forebody 5.0–5.3 mm. Coloration (Figs. 15, 34, 53, 71): head black; pronotum bright reddish; elytra black with bluish hue; scutellum black; abdomen completely black, except for the yellowish anterior half of segment IX and all of tergite X; legs: femora black with yellowish to yellowish-brown bases; tibiae and tarsi yellowish to reddish; antennae reddish-yellow to reddish, with apex of antennomere III and antennomeres IV–VI(VII) more or less distinctly infuscate.

Head (Fig. 15) very weakly transverse, only 1.01–1.03 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, weakly convex (nearly straight) in dorsal view; posterior angles obsolete; punctation moderately fine and moderately sparse, sparser in anterior and median dorsal portions; interstices much broader than diameter of punctures, without microreticulation; dorsal surface glossy. Eyes strongly convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 53) 4.0–4.2 mm long and conspicuously slender, antennomeres IV–VII nearly four times as long as broad.

Pronotum (Fig. 15) slender, 1.13–1.14 times as long as broad and approximately as broad as head; strongly convex in cross-section; punctation slightly more distinct than that of head; interstices without trace of microsculpture and glossy; midline broadly impunctate.

Elytra (Fig. 15) short, 0.55–0.57 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation coarse and moderately dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III.

Abdomen (Fig. 34) approximately 1.15 times as broad as elytra at posterior margin; punctation rather coarse and moderately dense; interstices distinctly broader than diameter of punctures, with microsculpture composed of transverse striae and very transverse meshes; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 204) strongly transverse, with impression along middle, this impression with sparse weakly modified setae in the middle and with a cluster of dense weakly modified setae on either side, posterior margin weakly concave; sternite VIII (Fig. 205) weakly transverse, posterior excision U-shaped and deep, approximately 0.5 times as deep as length of sternite; tergites IX–X as in Fig. 71; aedeagus (Figs. 108–110) 2.6 mm long, strongly sclerotized; right paramere longer than left paramere, both parameres somewhat twisted and apically acute; apex of ventral process broadly and weakly concave; dorsal plate and internal structures not available (missing in lectotype).

♀: sternite VIII (Fig. 206) distinctly oblong, posteriorly with median process of narrowly triangular shape.

Comparative notes

From the species with a reddish pronotum treated above, *P. kosempoensis* is readily distinguished by the complete absence of microsculpture on the head and pronotum, by the coloration of the abdomen (black, except for the yellowish tergite X and anterior half of segment IX), the slender habitus (weakly transverse head; distinctly oblong pronotum; slender elytra), the conspicuously slender antennae, the chaetotaxy of the male sternite VII, and by the morphology of the aedeagus (parameres twisted; ventral process apically concave).

Together with the following two species, *P. kosempoensis* forms an evidently monophyletic group constituted by several synapomorphies: antennae conspicuously long and slender; male sternite VII with pronounced median impression without, or with very sparse, setae; aedeagus strongly sclerotized. The aedeagus of the lectotype of *P. kosempoensis* is incomplete, but it can be inferred from the conditions in the aedeagi of the two following species that this species group also shares an aedeagus with a strongly sclerotized, broad (not elongated), and apically hooked dorsal plate, a set of variably shaped basal internal structures, and an elongated dorso-apical structure. Externally, this group is additionally distinguished from all other named *Megalopaederus* species known from Taiwan by a reddish pronotum without microsculpture and a slender habitus.

Distribution and natural history

The type locality is situated in Chiai Hsien, southwestern Taiwan (Fig. 228). Additional data are not available.

Paederus (Megalopaederus) discurrens **n. sp.**

(Figs. 16, 35, 54, 72, 111–113, 207–211, 228)

Type material

Holotype ♂ [with Laboulbeniales on the left antennomere III]: "Taiwan, Taichung County, Dong-Shi, Basianshan National Forest, Recreation Area / N24°11.431 E121°00.890, 27.v.2007, 926 m, G. Martin & D. L. J. Quicke, BMNH(E) 2007-43 / Holotypus ♂ *Paederus discurrens* sp. n., det. V. Assing 2014" (BMNH).

Etymology

The specific epithet is the present participle of the Latin verb discurrere (to run in a disordered or confused fashion) and alludes to the seemingly disordered arrangement of the internal structures of the aedeagus.

Description

Body length 10.7 mm; length of forebody 5.5 mm. Coloration (Figs. 16, 35, 54, 72): head black; pronotum bright reddish; elytra black with pronounced bluish hue; scutellum reddish with darker margins; abdomen: segments III–VIII black, hemitergites IX yellowish with the posterior portion black, sternite IX blackish-brown; legs with the femora blackish and the tibiae and tarsi reddish; antennae reddish.

Head (Fig. 16) weakly transverse, 1.04 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, weakly convex (nearly straight) in dorsal view; posterior angles obsolete; punctation moderately fine and sparse, sparser and finer in anterior and median dorsal portions; interstices much broader than diameter of punctures, without microreticulation; dorsal surface glossy. Eyes strongly convex, less than half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna (Fig. 54) 4.3 mm long and conspicuously slender, antennomeres IV–VII nearly four times as long as broad.

Pronotum (Fig. 16) 1.10 times as long as broad and approximately as broad as head; strongly convex in cross-section; punctation similar to that of head; interstices without trace of microsculpture and glossy; midline broadly impunctate.

Elytra (Fig. 16) short, 0.6 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation coarse and rather dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III.

Abdomen (Fig. 35) approximately 1.15 times as broad as elytra at posterior margin; punctation rather coarse and moderately dense; interstices distinctly broader than diameter of punctures, with microsculpture composed of transverse striae and very transverse meshes; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII strongly convex.

♂: sternite VII (Fig. 207) strongly transverse, with impression along middle, this impression without setae in the middle and with a large cluster of dense long setae on either side, posterior margin indistinctly concave in the middle; sternite VIII (Fig. 208) distinctly transverse, posterior excision U-shaped and deep, approximately 0.5 times as deep as length of sternite; tergites IX–X as in Fig. 72; aedeagus (Figs. 111–113) 2.3 mm long, strongly sclerotized; parameres of subequal length; right paramere apically more acute than left paramere and hooked; apex of ventral process narrowly concave (Fig. 211); dorsal plate strongly sclerotized and broad, apically hooked in the middle, far from reaching apices of parameres; internal sac (Figs. 209–210) with sclerotized basal structures arranged in disordered fashion and with oblong dorso-apical structure.

♀: unknown.

Comparative notes

From the similar and closely related *P. kosempoensis*, *P. discurrens* is distinguished by the uniformly reddish antennae, the reddish scutellum, the darker coloration of the femoral bases, the different chaetotaxy of the male sternite VII, the broader male sternite VIII, and by the morphology of the aedeagus (parameres of subequal length, ventral process of aedeagus apically narrowly concave).

Distribution and natural history

The type locality is situated in Taichung Hsien, western Taiwan (Fig. 228). The holotype was collected at an altitude of approximately 930 m in May. It is infested with Laboulbeniales.

Paederus (Megalopaederus) incisus **n. sp.**

(Figs. 17, 36, 55, 117–119, 212–216, 228)

Type material

Holotype ♂: "Nanshanchi, Nantou, Taiwan, 4.VI.1998, H. Sugaya leg. / Holotypus ♂ *Paederus incisus* sp. n., det. V. Assing 2014" (MNHUB).

Paratypes: 1 ♀: "Taiwan: Nanchanchi, Nantou, 1–2. II.1998, leg. H. Sugaya" (MNHUB); 2 ♀♀: "Taiwan: Nantou, Hueisun Exp. Forest [ca. 24°06′N, 121°02′E], 22–24.X.1998, leg. W. Mey, Ebert" (MNHUB, cAss); 1 ♀: "Hori-Musha, Formosa, 22. May. 1927, K. Yokoyama / *Paederus kosempoensis* Bernh., det. T. Adachi" (cOhn); 1 ♀: "Chosen-lintao, Nantou, Taiwan, 26.VI.1998, H. Sugaya leg." (MNHUB).

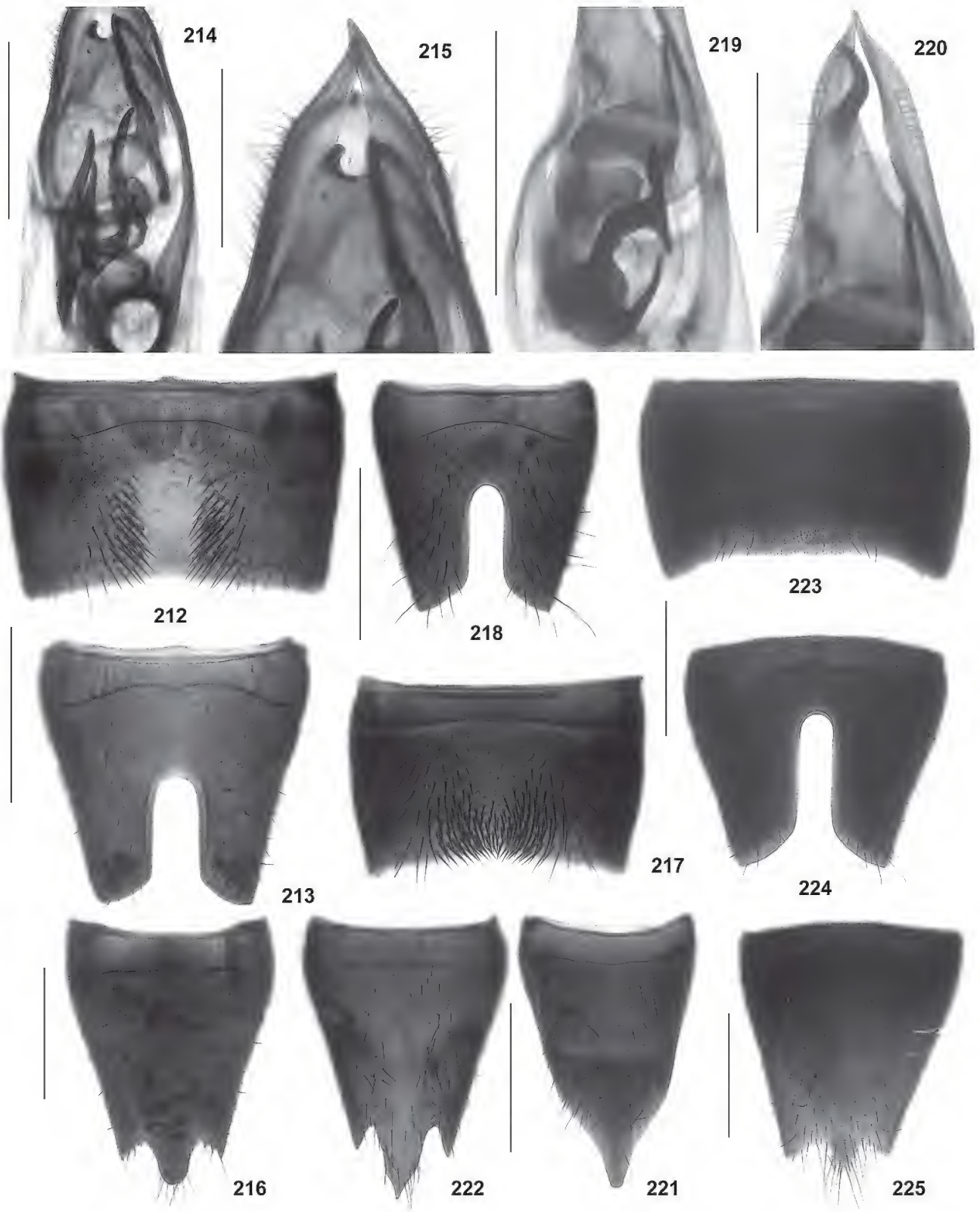
Etymology

The specific epithet (Latin, adjective) alludes to the strongly incised apex of the ventral process of the aedeagus.

Description

Body length 9.5–11.5 mm; length of forebody 5.0–5.5 mm. External characters (Figs. 17, 36, 55) as in *P. discurrens*.

♂: sternite VII (Fig. 212) strongly transverse, with impression along middle, this impression without setae in the middle and with a cluster of dense long setae on either side, posterior margin weakly concave; sternite VIII (Fig. 213) moderately transverse, posterior excision U-shaped and deep, approximately 0.5 times as deep as length of sternite; aedeagus (Figs. 217–219) 2.6 mm long, strongly sclerotized; parameres of subequal length and



Figs. 212–225. *Paederus incisus* (212–216), *P. biacutus* (217–222), *P. lewisi* (223–225). – **212**, **217**, **223**. Male sternite VII. **213**, **218**, **224**. Male sternite VIII. **214**, **219**. Internal structures of aedeagus in ventral view. **215**, **220**. Apical portion of aedeagus in ventral view. **216**, **222**, **225**. Female sternite VIII. **221**. Female tergite VIII. – Scale bars: 1.0 mm (212–214, 216–219, 221–225), 0.5 mm (215, 220).

apically acute; ventral process with pronounced apical incision (Fig. 215); dorsal plate strongly sclerotized and broad (dorsal view), strongly curved lateral view, and apically hooked in the middle; internal sac (Fig. 214) with four strongly sclerotized basal structures of different shapes and with long, strongly sclerotized dorso-apical structure.

♀: sternite VIII (Fig. 216) distinctly oblong; posterior projection rather long and apically convex (not acute).

Comparative notes

Based on the similarly derived shape and chaetotaxy of the male sternite VII and on the similarly derived morphology of the aedeagus, *P. incisus* is most closely related to *P. discurrens*, from which it differs by the less extensive clusters of setae on the male sternite VII and by the morphology of the aedagus (parameres more slender, apically more acute, and reaching farther beyond apex of dorsal plate; ventral process apically strongly incised; dorsal plate of different shape both in lateral and in dorsal view; internal sclerotized structures of different shapes and arrangement).

Distribution and natural history

The species was collected in some localities in Nantou Hsien (Fig. 228) in February, May–June, and October. Additional data are not available.

3.6 Unnamed species

The following probably undescribed species are represented only by females and remain unnamed:

Paederus (Megalopaederus) sp. 1

2 ♀♀: "Taiwan Kaohsiung Hsien, rd from Tengchih to Chuyushan, 1400 m, 25.IV.90, A. Smetana [T23]" (cSme); 1 ♀: "Taiwan, Kaohsiung, Tengchih 1400 m, 29.–30.iv.2001, leg. H. Sugaya" (MNHUB).

The above females represent a species closely allied to *P. kosempoensis*. In the key, it would key out at couplet 4, together with *P. discurrens* and *P. incisus*, from which it differs by the paler average coloration of the tibiae. In view of the restricted distributions of the *Megalopaederus* species of Taiwan, it appears unlikely that the above material is conspecific with *P. discurrens* or *P. incisus*.

Paederus (Megalopaederus) sp. 2

1 ♀: "Taiwan, Pingtung Hsien, Peitawushan trail at 1510 m, 26.IV.1992, A. Smetana [T100]" (cSme).

This species, too, belongs to the *P. kosempoensis* group. It is distinguished from the named species of this group by the nearly completely black tibiae.

Fig. 226. Distributions of species of the *P. formosanus* group in Taiwan: *Paederus formosanus* (black diamonds), *P. bivirgatus* (white circles), *P. flavoterminatus* (black circles), *P. alesi* (black triangle), *P. anmamontis* (white triangle), *P. alutithorax* (white square), *P. virgifer* (black squares), *P. incurvatus* (white stars), *P. adiectus* (black star), *P. aequilobatus* (black star), *P. excisissimus* (black star).

Paederus (Megalopaederus) sp. 3

1 ♀: "Taiwan–Hsinchu Co., Wufeng Twnsh., Rd. 122, km 26, 2000 m, mountain forest litter, 28.III.2008, leg. Vít [10]" (cAss).

This species is similar to *P. alutithorax* and allied species. It would key out at couplet 16 together with *P. anmamontis*, from which it differs by the less distinct metallic hue of the elytra.

Fig. 227. Distributions of species of the *P. formosanus* group in Taiwan: *Paederus trihamatus* (white circle), *P. fulvocaudatus* (black circles), *P. furcispinosus* (white diamond), *P. semiflavus* (black diamond).

Paederus (Megalopaederus) sp. 4

3 ♀♀: "Taiwan: Tengchih, Kaohsiung Hsien, 24.IV.1990, 1565 m, Fauch. arbustes, L. LeSage LL90-22" (cSme).

The above material would key out at couplet 7, together with *P. furcispinosus*, from which this species differs by black tibiae and very shallow microreticulation of the head and pronotum. The specimens were swept from shrubs.

Paederus (Megalopaederus) sp. 5

1 ♀: "Taiwan, Nantou Hsien, Nenkaoshan trail, 2050–2150 m, 8.V.1992, A. Smetana [T120]" (cSme).

This species, too, is of similar coloration as *P. furcispinosus*, but distinguished by somewhat larger body size.

Paederus (Megalopaederus) sp. 6

1 ♀: "Taiwan: Shanlinhsi, 10.V.1990, Fauchage dans forêt primaire, L. LeSage LL90-41" (cSme).

The above female, which was swept from vegetation in a primary forest, is similar to *P. virgifer* and *P. fulvocaudatus*, but differs from the former by the bright reddish pronotum and from the latter by the more pronounced microsculpture of the head and pronotum.

3.7 Examined *Paederus* species from China and Japan

Paederus biacutus Li, Zhou & Solodovnikov, 2013
(Figs. 18, 37, 56, 73, 114–116, 217–222)

Material examined

China: Fujian: 1 ♂, Guadun ["Kuatun"], 27°40′N, 117°40′E, 2300 m, 29.IV.1938, leg. Klapperich (BMNH); 1 ♀, same data, but 30.III.1938 (BMNH); 1 ♀, same data, but 10.IV.1938 (BMNH); 1 ♂, same data, but 10.V.1938 (cAss).

Comment

The description of this species is based on type material collected in several localities in Fujian province, China. Together with several other species, it was assigned to the *P. biacutus* species group (Li et al. 2013). Unfortunately, the description does not include some relevant structures, particularly the internal structures of the aedeagus. In order to facilitate a comparison with the *Megalopaederus* species from Taiwan, a redescription is provided below.

This species was studied to assess the significance of morphological characters and the phylogenetic affiliations of the *Megalopaederus* species from Taiwan. It is the geographically closest micropterous *Paederus* species in mainland China.

Redescription

Body length 8.7–10.3 mm; length of forebody 4.7–5.3 mm. Coloration (Figs. 18, 37, 56, 73): head black; pronotum bright reddish; elytra black with pronounced bluish-greenish hue; scutellum reddish with darker apex; abdomen black; legs with the femora blackish and the tibiae and tarsi reddish; antennae reddish.

Head (Fig. 18) distinctly transverse, but of rather variable shape, 1.10–1.20 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, weakly to distinctly convex in dor-

Fig. 228. Distributions of species of the *P. kosempoensis* group in Taiwan: *Paederus discurrens* (white circle), *P. incisus* (black circles), *P. kosempoensis* (white diamond).

sal view; posterior angles obsolete or weakly marked; punctation moderately fine and sparse, sparser and finer in anterior and median dorsal portions; interstices much broader than diameter of punctures, without microreticulation; dorsal surface glossy. Eyes moderately convex, approximately half as long as postocular region from posterior margin of eye to neck in dorsal view, or nearly so. Antenna (Fig. 56) 3.2–3.8 mm long, more slender in male than in female; male: antennomeres V–VIII approximately 2.5 times as long as broad; female: antennomeres V–VIII little more than twice as long as broad.

Pronotum (Fig. 18) approximately 1.05 times as long as broad and approximately 0.95 times as broad as head; strongly convex in cross-section; punctation similar to that of head; interstices without trace of microsculpture and glossy; midline broadly impunctate.

Elytra (Fig. 18) 0.55–0.60 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation coarse and moderately dense. Hind wings completely reduced. Metatarsomere I approximately as long as the combined length of II and III, or nearly so.

Abdomen (Fig. 37) approximately 1.1 times as broad as elytra at posterior margin; punctation moderately fine and moderately dense; interstices distinctly broader than diameter of punctures, with shallow transverse microsculpture; surface somewhat glossy; posterior margin of tergite VII without palisade fringe; tergite VIII sexually dimorphic.

♂: tergite VIII (Fig. 37) triangularly produced posteriorly, middle of posterior margin nearly acute; sternite VII (Fig. 217) moderately strongly transverse, in postero-median portion with rather extensive, but not very deep impression, this impression with a cluster of very dense and moderately stout setae, posterior margin weakly concave; sternite VIII (Fig. 218) weakly transverse, posterior excision U-shaped and deep, nearly 0.6 times as deep as length of sternite; hemitergites IX (Fig. 73) with the setiferous postero-lateral portions clearly delimited from the non-setiferous antero-median portion by fine line; aedeagus (Figs. 114–116) 2.3–2.4 mm long, strongly sclerotized; parameres of subequal length, of similar shape, and apically very acute; ventral process apically weakly convex; dorsal plate strongly asymmetric and apically extending into a pronounced hook (Fig. 220), not reaching apices of parameres; internal sac (Fig. 219) with two strongly sclerotized basal structures and one dorso-apical structure of characteristic shapes.

♀: tergite VIII (Fig. 221) much longer than broad, posteriorly with a pronounced median process; sternite VIII (Fig. 222) distinctly oblong, posteriorly with a long and apically conspicuously acute median process of subtriangular shape; hemitergites IX flattened and apically extending into a small spine; tergite X strongly convex in cross-section, anteriorly even keeled.

Comparative notes

Though similar in general appearance (size, proportions, coloration, microsculpture) and in the shape of the female sternite VIII to *P. kosempoensis* and allied species, *P. biacutus* is distinguished from them by several characters: the more transverse head, the distinctly less slender and sexually dimorphic antennae, the sexual dimorphism of the abdominal tergite VIII, the posteriorly nearly acute male tergite VIII, the different shape and chaetotaxy of the male sternite VII, the much deeper posterior excision

of the male sternite VIII, the different general morphology of the aedeagus (ventral process apically convex; dorsal plate strongly asymmetric and much more elongated apically; dorso-apical internal structure of different shape), the posteriorly strongly elongated female tergite VIII, the flattened and apically spinose female hemitergites IX, and the strongly convex (cross-section) female tergite X.

On the other hand, aside from the external similarity, *P. biacutus* shares some character conditions with the *Megalopaederus* species from Taiwan, such as the chaetotaxy of the male sternite VII, the shape of the male sternite VIII, the apically hooked dorsal plate of the aedeagus, the general arrangement of the internal structures and the shape of the dorso-apical structure, and a female sternite VIII with a triangular median projection posteriorly. Thus, although *P. biacutus* probably represents a different lineage, assigning this species and the *Megalopaederus* species from Taiwan to different taxa at the subgeneric, or even generic level would seem unjustified.

Distribution and natural history

The known distribution of this species is confined to Fujian province, but the possibility that it is present also in the adjacent parts of Jiangxi cannot be ruled out.

Paederus (Megalopaederus) lewisi Cameron, 1930
(Figs. 19, 38, 74–75, 120–122, 223–225)

Paederus lewisi Cameron 1930: 206.

Type material examined

Holotype ♀: "Japan, Chuzenji, at 4000 ft, 26.VIII.28, J. E. A. Lewis / *P. lewisi* Cam., Type / Type / Co-Type / Holotype / M. Cameron. Bequest. B. M. 1955-147. / Holotype *Paederus lewisi* Cameron, 1930, det. R. G. Booth, 2009 / *Paederus lewisi* Cameron, det. V. Assing 2014" (BMNH).

Additional material examined

Japan: 1 ♀, Nagano Pref., Usui pass, 5.VIII.1950 (NHMW); 4 ♀♀, Kyoto Pref., Mt. Daihi, 22.–23.VI.1951 (NHMW, cAss); 2 ♂♂, Honshu, Yamagata-ken, Mt. Haguro, 19.IX.2010, leg. Lackner (cAss).

Comment

The original description is based on a unique female from "Chuzenji" (Cameron 1930). Unlike the additional material examined, the holotype lacks the posterior median projection of the female sternite VIII. This, however, is probably an artefact (broken off) or a teratology.

Redescription

Large species; body length 10.5–13.5 mm; length of forebody 5.4–6.5 mm. Coloration (Figs. 19, 38, 74–75): head, pronotum, and abdomen black; elytra with vivid bluish hue; legs reddish-yellow with the apices of the femora narrowly blackish; antennae reddish-yellow to reddish.

Head (Fig. 19) of variable shape, distinctly transverse in male and weakly transverse in female, 1.01–1.11 times as broad as long; contours of posterior portion (behind eyes) converging from posterior margin of eyes, weakly convex (nearly straight) in dorsal view; posterior angles obsolete; punctation rather fine to moderately coarse and moderately to very sparse, even sparser and finer in anterior and median dorsal portions; interstices much broader than diameter of punctures, without microreticulation; dorsal surface glossy. Eyes moderately convex, somewhat less than half as long as postocular region from posterior margin of eye to neck in dorsal view. Antenna 4–5 mm long and very slender; antennomeres IV–VIII approximately 3 times as long as broad.

Pronotum (Fig. 19) rather slender, 1.1–1.2 times as long as broad and approximately 0.92–0.95 times as broad as head; strongly convex in cross-section; punctation fine and conspicuously sparse, much sparser than that of head; interstices without trace of microsculpture and glossy; midline broadly impunctate.

Elytra (Fig. 19) approximately 0.55 times as long as pronotum and of distinctly trapezoid shape; humeral angles obsolete; punctation conspicuously fine and sparse. Hind wings completely reduced. Metatarsomere I slightly shorter than the combined length of II and III.

Abdomen (Fig. 38) conspicuously large, 1.15–1.25 times as broad as elytra at posterior margin; punctation fine and sparse; interstices much broader than diameter of punctures, with shallow transverse microsculpture; posterior margin of tergite VII without palisade fringe; tergite VIII with moderate sexual dimorphism.

♂: tergite VIII convex posteriorly; sternite VII (Fig. 223) strongly transverse, in postero-median portion with shallow impression, pubescence not distinctly modified; sternite VIII (Fig. 224) distinctly transverse, approximately 1.2 times as broad as long, posterior excision U-shaped and conspicuously deep, at least 0.65 times as deep as length of sternite; hemitergites IX (Fig. 74) with the setiferous postero-lateral portions clearly delimited from the non-setiferous antero-median portion by fine line; aedeagus (Figs. 120–122) 3 mm long, strongly sclerotized; parameres conspicuously asymmetric and distinctly modified, right paramere curved, much longer, more slender, and apically more acute than left paramere; dorsal plate strongly asymmetric, obliquely curved to the right (ventral view); dorsal plate strongly asymmetric and apically hooked, far from reaching apex of right paramere; internal sac with dorso-apical structure, but without distinctly sclerotized basal spines.

♀: tergite VIII posteriorly more strongly convex than in male; sternite VIII (Fig. 225) oblong, posteriorly with a median process of subtriangular shape; hemitergites

IX (Fig. 75) flattened and apically extending into a stout spine; tergite X moderately convex in cross-section.

Comparative notes

Though similar in body size, the vivid bluish hue of the elytra, the shape of the male sternite VII, and the shape of the female sternite VIII to some *Megalopaederus* species from Taiwan, *P. lewisi* differs from them in many respects, particularly the fine and conspicuously sparse punctation of the pronotum, the broad abdomen, the sexual dimorphism of the abdominal tergite VIII, the conspicuously deep posterior excision of the male sternite VIII, the morphology and chaetotaxy of the male hemitergites IX, the extreme asymmetry of the parameres, the absence of distinct basal spines in the internal sac of the aedeagus, and the shapes of the female hemitergites IX and tergite X. In some respects, especially the shape and chaetotaxy of the male hemitergites IX, the male tergite X, and the shape of the female hemitergites IX, *P. lewisi* is more similar to *P. biacutus*, which is currently not assigned to *Megalopaederus*.

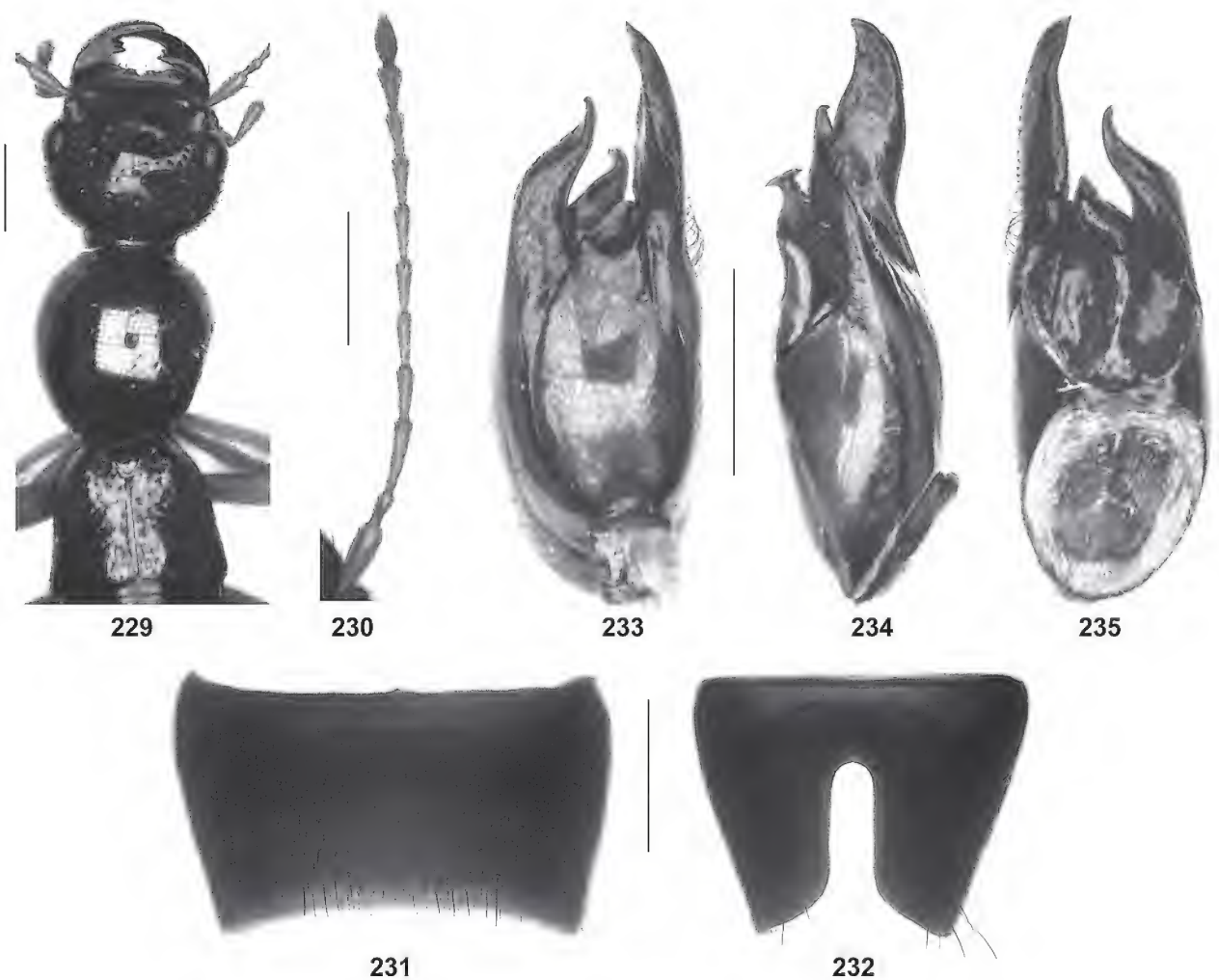
Distribution

Paederus lewisi is moderately widespread and apparently not uncommon in the central and northeastern parts of Honshu (Watanabe 1986).

Paederus (Megalopaederus) bucculentus **n. sp.**
(Figs. 229–235)

Type material

Holotype ♂: "Japan: Honshu, Nagano pr., trib. to Nakatsuna Lake, ca. 36°36′31″N, 137°49′53″E, 14.VI.2012, P. Zwick / *Paederus bucculentus* sp. n., det. V. Assing 2014" (cAss).



Figs. 229–235. *Paederus bucculentus*. – **229**. Forebody. **230**. Antenna. **231**. Male sternite VII. **232**. Male sternite VIII. **233**. Aedeagus in ventral view. **234**. Aedeagus in lateral view. **235**. Aedeagus in dorsal view. – Scale bars: 1.0 mm.

Etymology

The specific epithet (Latin, adjective: chubby-faced) alludes to the strongly convex postero-lateral portion of the head, one of the characters distinguishing this species from the similar *P. lewisi*.

Description

Large species; body length 15.5 mm; length of forebody 6.7 mm. Coloration (Fig. 229): head, pronotum, and abdomen black; elytra with vivid bluish hue; legs reddish-yellow with the apices of the femora narrowly blackish; antennae reddish-yellow to reddish.

Head (Fig. 229) strongly transverse, 1.25 times as broad as long; contours of postero-lateral portion (behind eyes) strongly convex in dorsal view. Antenna as in Fig. 230.

Pronotum weakly oblong, 1.08 times as long as broad and 0.97 times as broad as head.

Other external characters as in *P. lewisi*.

♂: tergite VIII strongly convex posteriorly; sternite VII (Fig. 231) strongly transverse, in postero-median portion with shallow impression, pubescence not distinctly modified, posterior margin broadly and weakly concave; sternite VIII (Fig. 232) distinctly transverse, approximately 1.35 times as broad as long, posterior excision narrowly U-shaped and conspicuously deep, approximately 0.65 times as deep as length of sternite; hemitergites IX with the setiferous postero-lateral portions clearly delimited from the non-setiferous antero-median portion by fine line; aedeagus (Figs. 233–235) 2.85 mm long, strongly sclerotized; parameres conspicuously asymmetric and distinctly modified, right paramere (ventral view) stout, nearly straight in ventral view, stout and somewhat dagger-shaped in lateral view, much longer than left paramere; left paramere stout and inversely S-shaped; dorsal plate strongly asymmetric, broad, and strongly sclerotized; internal sac with dorso-apical structure, but without distinctly sclerotized basal spines.

♀: unknown.

Comparative notes

As can be inferred from the similar external and male secondary sexual characters, as well as the similarly derived morphology of the aedeagus, *P. bucculentus* is probably most closely allied to *P. lewisi*, from which it differs by slightly larger size, different head shape (*P. lewisi*: head less strongly transverse; outline of postero-lateral portion weakly convex, nearly straight), the less oblong pronotum, the more transverse male sternite VIII, and particularly by the shape of the aedeagus (right paramere much stouter and not distinctly curved; left paramere S-shaped; differently shaped dorsal plate).

Distribution

The type locality is situated in the northwest of Nagano prefecture, northern Central Honshu. Additional data are not available.

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On the Staphylinidae (Coleoptera) of Crete II. Seven new species, a new synonymy, and additional records

Volker Assing

Abstract

Approximately 110 species of Staphylinidae collected in 2013 and 2014 are reported from the Greek island Crete. Seven species of Aleocharinae (four species), Paederinae (one species), and Staphylininae (two species) are described and illustrated, five of them are probably local endemics: *Bellatheta albimontis* **n. sp.** (Lefka Ori), *B. idana* **n. sp.** (Psiloritis), *Geostiba (Sipalotricha) paulexsecta* **n. sp.** (Psiloritis), *Myrmecopora (Myrmecopora) thriptica* **n. sp.** (Orno Thriptis; associated with *Messor* sp.), *Sunius thripticus* **n. sp.** (Orno Thriptis), *Quedius praecisus* **n. sp.** (Orno Thriptis, but probably more widespread in Crete), and *Xantholinus erinaceus* **n. sp.** (several localities). The sexual characters of some previously described species are illustrated. The following synonymy is proposed: *Quedius nemoralis* Baudi di Selve, 1848 = *Q. candicus* Coiffait, 1976, **n. syn.** The genus *Bellatheta* Roubal, 1928 is reported from Crete for the first time. Some previous records are rectified. The diversity and biogeography of the endemic species of Crete is discussed. A revised list of the 67 currently known named endemic (sub-) species of Staphylinidae of Crete is provided.

K e y w o r d s : Coleoptera, Staphylinidae, West Palaearctic region, Mediterranean, Greece, Crete, new species, new synonymy, endemism, myrmecophily, zoogeography, taxonomy.

Zusammenfassung

Während zweier Forschungsreisen nach Kreta in den Jahren 2013 und 2014 wurden insgesamt etwa 110 Arten nachgewiesen. Sieben Arten aus den Unterfamilien Aleocharinae (vier Arten), Paederinae (eine Art) und Staphylininae (zwei Arten), fünf davon vermutlich Lokalendemiten, werden beschrieben und abgebildet: *Bellatheta albimontis* **n. sp.** (Lefka Ori), *B. idana* **n. sp.** (Psiloritis), *Geostiba (Sipalotricha) paulexsecta* **n. sp.** (Psiloritis), *Myrmecopora (Myrmecopora) thriptica* **n. sp.** (Orno Thriptis; myrmecophil bei *Messor* sp.), *Sunius thripticus* **n. sp.** (Orno Thriptis), *Quedius praecisus* **n. sp.** (Orno Thriptis, aber wahrscheinlich weiter verbreitet auf Kreta) und *Xantholinus erinaceus* **n. sp.** (several localities). Die Sexualmerkmale einiger bereits beschriebener Arten werden abgebildet. *Quedius candicus* Coiffait, 1976, **n. syn.**, wird mit *Q. nemoralis* Baudi di Selve, 1848 synonymisiert. Die Gattung *Bellatheta* Roubal, 1928 wird erstmals von Kreta nachgewiesen. Einige frühere Nachweise werden korrigiert. Die Diversität und Biogeographie der Endemiten Kretas werden diskutiert. Eine aktualisierte Liste der 67 derzeit bekannten, beschriebenen endemischen Arten und Unterarten der Staphylinidae Kretas wird erstellt.

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1 Introduction

With 63 named endemic species and subspecies, plus several undescribed species of Scydmaeninae, Pselaphinae, and Aleocharinae, the endemic Staphylinidae fauna of Crete is significantly more diverse than that of other larger East Mediterranean islands such as Rhodes and Cyprus (Assing 2013a, b); for a list of these species see Assing (2013a). According to Frisch (pers. comm.), one of the species previously regarded as an island endemic, *Scopaeus creticus* Frisch, 1994, is to be deleted from this list, as it has been recorded also from Karpathos and Naxos. For more details regarding the geography, topography, and geological history of Crete see Assing (2013a).

The recent discovery of endemic species of some staphylinid genera (e. g., *Boreaphilus* Sahlberg, 1832, *Sunius* Stephens, 1829, *Astenus* Dejean, 1833, *Tectusa* Bernhauer, 1899, *Myrmecopora* Saulcy, 1865, and *Geostiba* Thomson, 1858) in some of the mountain ranges of Crete (Assing 2002, 2003, 2013a) gave rise to the hypoth-

esis that additional species could be expected in similar habitats of other mountain ranges, too. Thus, two more field trips were conducted to western Crete and central and eastern Crete in December and January 2013/2014 and in April 2014, respectively. The first field trip was conducted together with THOMAS FORCKE (Pforzheim) and the second with PAUL WUNDERLE (Mönchengladbach). Both excursions yielded several new discoveries, among them the presence of endemic species of a genus that had not been recorded from Crete.

Acknowledgements

I am indebted to VOLKER BRACHAT (Geretsried) and HEINRICH MEYBOHM (Großhansdorf) for identifying the species of Pselaphinae and Scydmaeninae, respectively, as well as to THOMAS FORCKE (Pforzheim) for the gift of the Staphylinidae he collected during our joint field trip. JÜRGEN VOGEL (Görlitz) identified *Atheta luctuosa*. BENEDIKT FELDMANN (Münster) proof-read the manuscript.

2 Material and methods

The Pselaphinae and Scydmaeninae referred to in this study are deposited in the private collections of VOLKER BRACHAT and HEINRICH MEYBOHM, respectively. The remaining material is deposited in the following public and private collections:

cAss	author's private collection
cSch	private collection MICHAEL SCHÜLKE, Berlin
cWun	private collection PAUL WUNDERLE, Mönchengladbach
MNHUB	Museum für Naturkunde der Humboldt-Universtität, Berlin

The morphological studies were conducted using a Stemi SV 11 microscope (Zeiss Germany) and a Jenalab compound microscope (Carl Zeiss Jena). Some of the images of the forebody and the antennae were created using a photographing device constructed by Arved Lompe (Nienburg) and CombineZ software. For the remaining photographs a digital camera (Nikon Coolpix 995) was used.

Head length was measured from the anterior margin of the clypeus (Aleocharinae) or from the anterior margin of the frons (Paederinae, Staphylininae) to the posterior margin of the head, elytral length at the suture from the apex of the scutellum to the posterior margin of the elytra, total length from the anterior margin of the mandibles (in resting position) to the apex of the abdomen, the length of the forebody from the anterior margin of the mandibles to the posterior margin of the elytra, and the length of (the median lobe of) the aedeagus from the apex of the ventral process to the base of the aedeagal capsule. The side of the aedeagus with the sperm duct opening is referred to as the ventral, the opposite side as the dorsal aspect. Regarding *Xantholinus*, the description is based on the actual position of the aedeagus in the abdomen. Thus, the side with the opening is referred to as the distal portion, the other side the proximal portion, and the undissected aedeagus is given in dorsal view.

The individual labels of type specimens are separated by slashes; they are cited in the original spelling and format, except that the following adaptations were made according to the general format requirements of the journal: names of persons (except authors of species) in small capitals, scientific names of genera and species in italics.

3 Results

3.1 General remarks

Including the new species described in section 3.5 and considering the new synonymy proposed in section 3.4, 67 named endemic species and subspecies of Staphylinidae are now known from Crete, not counting *Medon cerrutii* Coiffait, 1976, which has been recorded also from the adjacent island Karpathos.

Based on currently available evidence, 26 of the 67 species are local endemics, whose distribution in Crete is confined to only one mountain range (with one species, *Astenus minos*, distributed from the Lefka Ori to the extreme west of the island). Whether or not *Lesteva nitidicollis* and *L. szekessyi* (not included in the 26 species) are local endemics or more widespread across the island, is unclear. These two species are currently known only from their respective type localities in the Psiloritis range, but *Lesteva* species do not usually have highly restricted distributions and are not specially adapted to high-altitude habitats. Similarly, *Lesteva brondeeli* has been recorded only from the type locality "Topolia" in West Crete at a relatively low altitude and is thus most unlikely to represent a local endemic. The 26 locally endemic species are confined to the extreme west of Crete (two species, including *Astenus minos*), the Lefka Ori (six species, including *Astenus minos*), the Psiloritis range (six species), the Dikti Oros (six species), and the Orno Thriptis (six species). In view of the relatively low altitude (less than 1500 m altitude) of the Orno Thriptis, its diversity of local endemics seems remarkable. However, the easternmost part of Crete (with the Orno Thriptis) formed a separate island during warmer geological periods with higher sea-levels, which may explain this phenomenon.

Geostiba, the genus with the greatest diversity of endemic taxa, is now represented by eight locally endemic species, two in the Lefka Ori, three in the Psiloritis range, two in the Dikti Oros, and one in the Orno Thriptis.

Crete hosts a remarkable number of locally endemic myrmecophilous species of *Myrmecopora* sensu strictu, all of them associated with harvester ants (*Messor* spp.). Five species are now known, one in each of the four major mountain ranges and one, *M. fornicata*, in the extreme west of Crete. The distribution of *M. fornicata*, whose original description is based on a holotype without specified locality, was previously unclear.

What came as a surprise was the discovery of a micropterous, evidently locally endemic species of *Bellatheta* Roubal, 1928, a genus previously unknown from Crete, in the Lefka Ori in December, 2013 and the subsequent record of another one in the Psiloritis range in April, 2014. In the West Palaearctic, this genus has a discontinuous distribution. The geographically closest micropterous conge-

ner has been recorded from the Greek island Kefallinía, which is separated from Crete by some 400 km. Attempts at finding *Bellatheta* in suitable habitats in the Dikti Oros and the Orno Thriptis were not successful.

Three species of *Boreaphilus* have been recorded from the island, one of them widespread in practically all of the Mediterranean region. A second species, *B. meybohmi*, is most likely locally endemic to the Lefka Ori, as can be inferred from the adaptive reductions of the eyes, the wings, and the pigmentation. The third species, *B. fuelscheri*, was previously recorded only from the Dikti Oros, but is now known also from the Orno Thriptis in the very east of Crete and the Askifou Plateau to the east of the Lefka Ori in the west. Thus, it can no longer be considered a local endemic.

The *Sunius seminiger* group is now represented in Crete by two local endemics, one of them in the Dikti Oros and one in the Orno Thriptis. Despite extensive search, no representative of this species group was found in the Psiloritis range and in the Lefka Ori.

The two newly described species of Staphylininae, *Quedius praecisus* and *Xantholinus erinaceus*, are probably distributed across the whole island and may previously have been confounded with similar species (*Quedius nemoralis*, *Xantholinus rufipennis*).

Aside from those already outlined above, there are some more evident gaps in the diversity and biogeography of Cretan endemics. For instance, myrmecophilous *Astenus* species of the subgenus *Eurysunius* Reitter, 1909 are currently known only from the Orno Thriptis in the extreme east and from the extreme west (Lefka Ori and western extensions). Locally endemic species of *Tectusa* have been recorded from all major mountain ranges, except for the Psiloritis range; considerable efforts in searching suitable habitats in the Psiloritis for *Tectusa* species proved unsuccessful. Remarkably, the Psiloritis range is not only special in that endemic representatives of several genera appear to be absent, but also in that it hosts high-altitude species that have not been found in other mountains of Crete, e. g., two endemic species of *Lesteva* Latreille, 1797, *Deliphrosoma fratellum*, and *Atheta luctuosa*.

3.2 Revised list of named endemics of Crete

The following list gives the named endemic (sub-)species of Crete with the distribution of local endemics and – where necessary – remarks (in square brackets). Local endemics, i. e., species confined to a single mountain range in Crete, are marked with an asterisk. *Medon cerrutii* Coiffait, 1976, which was listed as an island endemic by Assing (2013a), is omitted, as it has been recorded also from Karpathos.

Boreaphilus fuelscheri Zerche, 1990
**Boreaphilus meybohmi* Assing, 2002 – Lefka Ori
Lesteva longoelytrata cretica Lohse & Steel, 1961
Lesteva brondeeli Lohse & Steel, 1961 [known only from the type locality ("Topolia" in West Crete), but most unlikely to be locally endemic, since the holotype was collected at low altitude]
**?Lesteva nitidicollis* Lohse & Steel, 1961 [known only from the type locality ("Antr. Jovis, Mt. Ida" in the Psiloritis range)]
**?Lesteva szekessyi* Lohse & Steel, 1961 [known only from the type locality ("Antr. Jovis, Mt. Ida, 2200 m" in the Psiloritis range)]
Amauronyx paganettii W. Blattný & C. Blattný, 1916
Batrisodes paganettii W. Blattný & C. Blattný, 1916
Brachygluta gnosiaca Besuchet, 2004
Claviger oertzeni Reitter, 1885
Tychus creticus Reitter, 1885
Tychus lagrecai Sabella, 2002
Tychus reitterianus Löbl, 1998
Alevonota cretica Assing & Wunderle, 2008
Aloconota brachyptera Assing, 2013
Aloconota minoica Pace, 2002
Atheta biroi Scheerpeltz, 1964 [status doubtful]
Atheta cretica Brundin, 1944
**Bellatheta albimontis* n. sp. – Lefka Ori
**Bellatheta idana* n. sp. – Psiloritis
Dinusa cretica Assing, 2013
Drusilla cretica Assing, 2005
**Geostiba albimontis* Assing, 2007 – Lefka Ori
**Geostiba diktiana* Assing, 2013 – Dikti Oros
**Geostiba exsecta* Assing, 1999 – Psiloritis
**Geostiba icaria* Pace, 1996 – Lefka Ori
**Geostiba idaea* Pace, 1996 – Psiloritis
**Geostiba meybohmi* Assing, 2000 – Dikti Oros
**Geostiba paulexsecta* n. sp. – Psiloritis
**Geostiba thryptisensis* Assing, 2001 – Orno Thriptis
**Myrmecopora elisa* Assing, 1997 – Dikti Oros
**Myrmecopora fornicata* Assing, 1997 – extreme west of Crete, west of approximately 23°42′E
**Myrmecopora idana* Assing, 2013 – Psiloritis
**Myrmecopora plana* Assing, 1997 – Lefka Ori, eastwards to Askifou Plateau
**Myrmecopora thriptica* n. sp. – Orno Thriptis
Ocalea cretica Coiffait, 1976
**Oxypoda cretica* Assing, 2006 – Dikti Oros
**Oxypoda idana* Assing, 2013 – Psiloritis
Phytosus holtzi Bernhauer, 1935
Pronomaea wunderlei Assing, 2007
**Tectusa callicera* Assing, 2002 – Lefka Ori
**Tectusa diktiana* Assing, 2013 – Dikti Oros
**Tectusa thriptica* Assing, 2013 – Orno Thriptis
Stenus ariadne Puthz, 1977
Eutheia paganettii Franz, 1971
Scydmoraphes fuelscheri Meybohm, 2008
Scydmoraphes minotauri Meybohm, 2008
Scydmoraphes ziegleri Meybohm, 2008
Stenichnus basimpressus W. Blattný & C. Blattný, 1916
Stenichnus creticus W. Blattný & C. Blattný, 1916
Stenichnus hummleri W. Blattný & C. Blattný, 1916
**Astenus minos* Assing, 2003 – Lefka Ori and extreme west of Crete
**Astenus thripticus* Assing, 2013 – Orno Thriptis
Leptobium creticum Coiffait, 1973
**Leptobium thryptisense* Assing, 2005 – Orno Thriptis

Lobrathium candicum Bordoni, 2009
Medon beroni Coiffait, 1970
Pseudolathra cretensis Bordoni, 1986 [status doubtful]
Scopaeus muehlei Frisch, 1994
**Sunius diktianus* Assing, 2013 – Dikti Oros
**Sunius thripticus* n. sp. – Orno Thriptis
Quedius fulgidus creticus Mařan, 1935 [status doubtful]
Quedius praecisus n. sp.
Quedius sigwalti Coiffait, 1972
Xantholinus creticus Assing, 2008
Xantholinus erinaceus n. sp.
Xantholinus minos Assing, 2008

3.3 Staphylinidae recorded from Crete in 2013 and 2014

In all, approximately 2530 specimens of Staphylinidae belonging to at least 111 species were collected. Seven of them, five of them presumably local endemics and two island endemics, are described for the first time. It was not possible to identify all the material down to species level; for explanations see Assing (2013a). Except for a few specimens (< 10 specimens), material collected by Paul Wunderle in April 2014 has not been identified and is consequently not included in the list below. However, the paratypes of the newly described species collected by him are listed in section 3.5.

A complete list of species and records from 2013 and 2014 is given below. The number of specimens is given in parentheses behind the sample number. The chronological order of the subfamilies is arranged according to Smetana (2004). The genera and species within the subfamilies are arranged in alphabetical order.

Localities and collection data corresponding to the sample numbers of the list below are as follows [sample numbers 1–19: 24.XII.2013–1.I.2014, leg. Assing & Forcke; sample numbers 20–47: 6.–17.IV.2014, leg. Assing]: **1**: Lefka Ori, NE Omalos, 35°22′N, 23°55′E, 950 m, stony pasture, under stones, 24.XII.2013; **2**: Lefka Ori, NE Omalos, 35°21′N, 23°55′E, 1040 m, stony pasture, under stones, 24.XII.2013; **3**: Lefka Ori, Omalos plateau, 35°20′N, 23°53′E, 1050 m, moist pasture with artificial reservoirs, under stones, 24. and 25.XII.2013; **4**: Lefka Ori, Omalos plateau, 35°20′N, 23°51′E, 930 m, stony pasture with shrubs, under stones, 24. and 25.XII.2013; **5**: Lefka Ori, Omalos plateau, 35°20′N, 23°52′E, 1080 m, pasture near road margin, under stones, 25.XII.2013; **6**: Lefka Ori, Omalos plateau, 35°19′N, 23°53′E, 1040 m, N-slope, pasture with small trees, under stones, 25.XII.2013; **7**: Lefka Ori, SE Omalos, 35°19′N, 23°56′E, 1590 m, E-slope with snow, under stones, 26.XII.2013; **8**: Lefka Ori, SE Omalos, 35°19′N, 23°56′E, 1590 m, E-slope with snow, litter, grass roots, etc. sifted, 26.XII.2013; **9**: Lefka Ori, SE Omalos, 35°19′N, 23°55′E, 1240 m, pasture with trees, under stones, 26.XII.2013; **10**: Chania, 35°31′N, 24°00′E, 1 m, sandy beach, under debris, 27. and 31.XII.2013; **11**: Askifou → Asigonia, 35°15′N, 24°11′E, 1060 m, pasture and margin of pista, under stones, 28.XII.2013; **12**: Askifou → Asigonia, 35°15′N, 24°11′E, 1060 m, pasture with scattered trees and bushes, litter and roots sifted, 28.XII.2013; **13**: Askifou → Asigonia, 35°15′N, 24°14′E, 880 m, pasture and margin of pista, under stones, 28.XII.2013; **14**: 17 km S Kissamos, N Archontiko, 35°20′N, 23°40′E, 760 m, stony pasture, under stones, 29. and 31.XII.2013; **15**: 19 km S Kissamos, radar station SW Moustakos, 35°19′N, 23°36′E, 890 m, stony slope, under stones, 29.XII.2013; **16**: 19 km S Kissamos, radar station SW Moustakos, 35°18′N, 23°37′E, 950 m, stony slope, under stones, 30.–31.XII.2013; **17**: 19 km S Kissamos, radar station SW Moustakos, 35°18′N, 23°37′E, 950 m, stony N-slope, litter under thorny cushion plants sifted, 30.XII.2013; **18**: 3 km SE Kandanos, 35°18′N, 23°45′E, 860 m, pasture, under stones, 30.XII.2013; **19**: Askifou → Asigonia, 35°15′39″N, 24°10′46″E, 850 m, pasture, under stones, 1.I.2014; **20**: Orno Thriptis, E Thripti, 35°06′N, 25°53′E, 970 m, moist meadow, under stones, 7. and 8.IV.2014; **20a**: same locality, grass roots and soil sifted, 7.IV.2014; **21**: Orno Thriptis, SE Thripti, 35°05′N, 25°53′E, 1130 m, grass and oak litter sifted, 7.IV.2014; **22**: Orno Thriptis, SE Thripti, 35°05′N, 25°53′E, 1300 m, under stones, 8.IV.2014; **23**: Orno Thriptis, 35°05′N, 25°52′E, 1380 m, rocky N-slope, grass, moss and oak litter sifted, 8.IV.2014; **24**: Orno Thriptis, E Thripti, 35°06′N, 25°53′E, 970 m, moist meadow, under stones, 10.IV.2014; **24a**: same data, but 11.IV.2014; **25**: Dikti Oros, 35°06′N, 25°29′E, 1750 m, margins of snowfields, under stones, 6.IV.2014; **26**: Dikti Oros, 35°06′N, 25°29′E, 1830 m, N-slope with snowfields, sifted, 6.IV.2014; **27**: NW Dikti Oros, Limnakaro, 35°08′N, 25°29′E, 1170 m, under stones, 9.IV.2014; **28**: NW Dikti Oros, Limnakaro, 35°08′N, 25°29′E, 1260 m, under stones, 9.IV.2014; **29**: NW Dikti Oros, 35°07′N, 25°29′E, 1440 m, litter near snowfield sifted, 9.IV.2014; **30**: Dikti Oros, 35°07′N, 25°29′E, 1700 m, soil and litter near snowfield, 9.IV.2014; **31**: WSW Agios Nikolaos, Katharo plateau, 35°08′N, 25°34′E, 1110 m, stream bank with gravel, 11.IV.2014; **32**: Psiloritis, Nida Plateau, SW Anogia, 35°13′N, 24°51′E, 1450 m, grassy N-slope, under stones, 12.IV.2014; **33**: Psiloritis, Nida Plateau, SW Anogia, 35°13′20″N, 24°49′42″E, 1510 m, grassy slopes with rocks, under stones, 12.IV.2014; **34**: Psiloritis, Nida Plateau, SW Anogia, 35°13′N, 24°50′E, 1550 m, grassy slopes with rocks, under stones, 12.IV.2014; **35**: Psiloritis, Nida Plateau, SW Anogia, 35°13′N, 24°50′E, 1510 m, N-slope with scattered oak trees, litter and grass sifted, 12.IV.2014; **36**: Psiloritis, SW Anogia, Mygerou Refuge, 35°14′N, 24°47′E, 1670 m, margins of snowfields sifted, 13.IV.2014; **37**: SW Anogia, Mygerou Refuge, 35°14′N, 24°47′E, 1700 m, margins of snowfield sifted, 13.IV.2014; **38**: Psiloritis, SW Anogia, Mygerou Refuge, 35°14′N, 24°47′E, 1550 m, under stones, 13.IV.2014; **39**: NW Perama, 35°25′N, 24°41′E, 10 m, ruderal river bank, under stones, 14.IV.2014; **40**: Psiloritis, W Anogia, 35°18′N, 24°50′E, 590 m, stony pasture, under stones, 14.IV.2014; **41**: Psiloritis, Nida Plateau, SW Anogia, 35°13′N, 24°51′E, 1430 m, grassy slope, under stones, 15.IV.2014; **42**: Psiloritis, Nida Plateau, SW Anogia, 35°13′N, 24°50′E, 1420 m, N-slope and valley bottom, under stones, 15.IV.2014; **43**: Psiloritis, ca. 8 km SSW Zoniana, 35°14′N, 24°48′E, 1730 m, litter and soil near margins of snowfields sifted, 15.IV.2014; **44**: Psiloritis, ca. 6 km S Zoniana, 35°14′N, 24°49′E, 1250 m, stony pasture, under stones, 16.IV.2014; **45**: Psiloritis, Nida Plateau, SW Anogia, 35°12′N, 24°53′E, 1520 m, steep calcareous NE-slope with scattered oak, grass roots and litter sifted, 16.IV.2014; **46**: Psiloritis, Nida Plateau, SW Anogia, 35°13′N, 24°53′E, 1480 m, calcareous pasture, under stones, 17.IV.2014; **47**: Kouloukonas, E Perama, 35°23′N, 24°50′E, 370 m, calcareous N-slope with secondary forest, litter sifted, 17.IV.2014.

Omaliinae

Boreaphilus fuelscheri Zerche, 1990 – 12 (2), 21 (1)
Boreaphilus meybohmi Assing, 2002 – 8 (10)
Boreaphilus velox (Heer, 1839) – 35 (1), 36 (1)

Deliphrosoma fratellum (Rottenberg, 1874) – 36 (8)
Lesteva longoelytrata cretica Lohse & Steel, 1961 – 25 (12), 26 (6), 29 (1), 30 (17), 31 (1), 36 (15), 37 (2), 43 (5)
Omalium cinnamomeum Kraatz, 1857 – 8 (6), 12 (3), 23 (4), 29 (3), 30 (2), 35 (2), 36 (1), 42 (1), 45 (2)
Omalium excavatum Stephens, 1834 – 10 (10), 29 (19), 30 (4), 35 (3), 36 (4)
Omalium rhodicum Assing & Zanetti, 2013 – 26 (1)
Omalium rugatum Mulsant & Rey, 1880 – 29 (1)

Proteininae

Proteinus atomarius Erichson, 1840 (♀) – 47 (1)
Proteinus creticus Assing, 2004 – 21 (1), 23 (2), 26 (1), 29 (142), 30 (3), 35 (13), 36 (2)
Proteinus ovalis Stephens, 1834 – 10 (1), 29 (72), 30 (5), 36 (4)

Pselaphinae

Afropselaphus n. sp. – 8 (1)
Brachygluta ochanensis (Reitter, 1909) – 12 (1)
Brachygluta cavernosa (Saulcy, 1876) – 29 (1)
Bythinus n. sp. – 35 (1)
Enoptostomus globulicornis (Motschulsky, 1851) – 24 (4)
Tribatus creticus Reitter, 1884 – 39 (1)
Tychus lagrecai Sabella, 2002 – 29 (2)

Tachyporinae

Mycetoporus dispersus Schülke & Kocian, 2000 – 29 (1)
Mycetoporus ignidorsum Eppelsheim, 1880 – 20a (2), 23 (2), 36 (1)
Mycetoporus reichei (Pandellé, 1869) – 26 (1)
Mycetoporus cf. *simillimus* Fagel, 1965 – 47 (3)
Mycetoporus sp. (*baudueri* group) – 35 (1)
Tachinus bonvouloiri Pandellé, 1869 – 11 (1)
Tachyporus abner Saulcy, 1865 – 17 (1), 39 (3)
Tachyporus nitidulus (Fabricius, 1781) – 5 (1), 15 (1), 29 (2), 30 (2), 35 (1), 36 (4), 37 (1), 44 (1)

Aleocharinae

Alevonota cretica Assing & Wunderle, 2008 – 23 (2)
Aloconota brachyptera Assing, 2013 – 14 (1)
Atheta aeneicollis (Sharp, 1869) – 4 (1), 10 (36), 20 (7), 20a (15), 21 (18), 23 (6), 24 (1), 24a (4), 35 (2), 44 (1), 47 (4)
Atheta amicula (Stephens, 1832) – 10 (5), 35 (1), 45 (1)
Atheta cf. *clientula* (Erichson, 1839) – 47 (102)
Atheta cretica Brundin, 1944 – 3 (2)
Atheta luctuosa (Mulsant & Rey, 1853) – 36 (122), 37 (13), 43 (3)
Atheta nigra (Kraatz, 1856) – 10 (1)
Atheta (*Mocyta*) spp. – 10 (321), 20a (3), 23 (2), 24 (5), 24a (4), 26 (4), 29 (1), 30 (1), 35 (2), 36 (2), 43 (1), 44 (1), 47 (5)
Bellatheta albimontis n. sp. – 8 (4)
Bellatheta idana n. sp. – 36 (10), 37 (2)
Caloderina hierosolymitana (Saulcy, 1865) – 24 (1)
Dinusa cretica Assing, 2013 – 5 (1), 18 (1)
Drusilla cretica Assing, 2005 – 12 (2), 44 (4), 47 (1)
Geostiba idaea Pace, 1996 – 35 (23), 45 (2), 47 (5)
Geostiba oertzeni (Eppelsheim, 1888) – 8 (8), 15 (2), 17 (6)
Geostiba paulexsecta n. sp. – 36 (1), 37 (3), 43 (65)
Hydrosmecta sp. – 31 (32)
Hydrosmecta sp. – 31 (23)
Hydrosmecta sp. – 31 (7)
Liogluta longiuscula (Gravenhorst, 1802) – 10 (3), 21 (8), 24 (1), 24a (5), 26 (13), 29 (299), 30 (32), 31 (1), 35 (15), 36 (121), 37 (13), 42 (1), 43 (19), 44 (1), 45 (7), 46 (1)
Myrmecopora elisa Assing, 1997 – 27 (1), 28 (3)
Myrmecopora fornicata Assing, 1997 – 14 (54), 15 (5), 16 (5), 18 (8)
Myrmecopora idana Assing, 2013 – 32 (19), 33 (30), 34 (6), 41 (29), 42 (59)
Myrmecopora laesa (Erichson, 1839) – 10 (1)
Myrmecopora plana Assing, 1997 – 4 (8), 11 (5), 13 (11)
Myrmecopora thriptica n. sp. – 22 (3), 24a (7)
Ocalea cretica Coiffait, 1976 – 8 (2)
Oligota sp. (♀) – 20a (1)
Oxypoda bimaculata Baudi, 1870 – 20a (1)
Oxypoda haemorrhoa (Mannerheim, 1830) – 14 (1)
Oxypoda lesbia Assing, 2005 – 8 (1)
Oxypoda lurida Wollaston, 1857 – 15 (1), 20a (2)
Oxypoda vicina Kraatz, 1858 – 44 (8)
Oxypoda (*Baeoglena*) sp. – 47 (1)
Phytosus balticus Kraatz, 1859 – 10 (2)
Tectusa callicera Assing, 2002 – 8 (1)
Tectusa diktiana Assing, 2013 – 26 (11)

Oxytelinae

Anotylus inustus (Gravenhorst, 1806) – 2 (3), 3 (1), 4 (2), 5 (7), 7 (14), 8 (2), 9 (2), 14 (2), 20 (10), 20a (4), 24 (4), 24a (12), 31 (9), 32 (1), 41 (4), 42 (1), 44 (4)
Anotylus sculpturatus (Gravenhorst, 1806) – 47 (1)
Carpelimus corticinus (Gravenhorst, 1806) – 10 (1), 31 (2)
Platystethus alutaceus Thomson, 1861 – 3 (9)
Platystethus degener Mulsant & Rey, 1878 – 31 (2)
Platystethus nitens (Sahlberg, 1832) – 20a (1), 31 (1)

Steninae

Stenus aceris Stephens, 1833 – 47 (1)
Stenus hospes Erichson, 1840 – 18 (4), 20a (1)
Stenus ochropus Kiesenwetter, 1858 – 12 (2), 17 (1)
Stenus parcior Bernhauer, 1929 – 13 (1), 20 (1), 24a (1)
Stenus subaeneus Erichson, 1840 – 20 (8), 20a (29), 21 (1), 22 (1), 24 (2), 25 (2), 29 (5), 30 (4), 32 (1), 33 (1), 35 (11), 36 (3), 41 (1), 43 (2), 44 (4), 45 (7), 46 (1)

Scydmaeninae

Leptomastax sp. aff. *bisetosa* Reitter, 1884 – 45 (4)
Stenichnus n. sp. – 26 (1), 29 (1)

Paederinae

Astenus lyonessius (Joy, 1908) – 24a (1)
Astenus minos Assing, 2003 – 15 (1), 16 (13)
Astenus procerus (Gravenhorst, 1806) – 33 (1), 38 (1), 41 (1)
Astenus thoracicus (Baudi, 1857) – 12 (1), 20 (6), 24 (3), 24a (1), 25 (1)
Astenus thripticus Assing, 2013 – 20 (1), 24 (1)
Domene stilicina (Erichson, 1840) – 19 (1), 40 (2)
Leptobium creticum Coiffait, 1973 – 24 (3)
Lobrathium candicum Bordoni, 2009 – 1 (1), 6 (1)
Medon dilutus pythonissa (Saulcy, 1865) – 5 (1), 47 (4)
Ochthephilum cf. *collare* (Reitter, 1884) (♀) – 10 (1)
Paederus fuscipes Curtis, 1826 – 39 (1)
Pseudobium hellenicum Assing, 2006 (♀♀) – 31 (5)
Sunius fallax (Lokay, 1919) – 2 (1), 3 (1), 5 (1), 13 (1), 14 (2), 20 (2), 24 (1), 24a (2), 44 (3), 46 (1)
Sunius thripticus n. sp. – 20 (1), 24 (1), 24a (1)

Staphylininae

Gyrohypnus angustatus Stephens, 1833 – 10 (1)
Heterothops cf. *minutus* Wollaston, 1860 – 10 (1)

Ocypus mus (Brullé, 1832) – 2 (1), 14 (2)
Ocypus olens (O. Müller, 1764) – 11 (1), 13 (2), 14 (1), 15 (2), 16 (1), 19 (1)
Ocypus sericeicollis (Ménétriés, 1832) – 5 (1), 14 (1)
Othius laeviusculus Stephens, 1833 – 20a (3), 24 (1)
Othius lapidicola Märkel & Kiesenwetter, 1848 – 12 (5), 17 (1), 20 (1), 21 (1), 23 (2), 30 (2)
Philonthus concinnus (Gravenhorst, 1802) – 2 (1)
Philonthus intermedius (Lacordaire, 1835) – 10 (3)
Philonthus nitidicollis (Lacordaire, 1835) – 3 (1)
Quedius cinctus (Paykull, 1790) – 10 (2)
Quedius humeralis Stephens, 1832 – 20 (2), 20a (19), 23 (4)
Quedius levicollis (Brullé, 1832) – 3 (1), 10 (1), 13 (1), 14 (1), 39 (1)
Quedius nemoralis Baudi, 1848 – 21 (2), 35 (2)
Quedius praecisus n. sp. – 20 (1), 20a (2), 21 (1)
Quedius scintillans (Gravenhorst, 1806) – 10 (10)
Quedius sigwalti Coiffait, 1972 – 10 (1), 20 (2)
Xantholinus erinaceus n. sp. – 2 (1), 10 (1), 13 (1), 14 (1), 39 (3)
Xantholinus minos Assing, 2008 – 39 (1)

3.4 Remarks on some described species

Boreaphilus fuelscheri

This species was previously known from three localities in the Dikti Oros in the east of Crete (Assing 2013a). In the list of Cretan endemics (Assing 2013a) it was erroneously indicated for the Psiloritis, central Crete. The new records listed in section 3.3, one of them from the eastern extensions of the Lefka Ori in western Crete and the other from the Orno Thripti in the extreme east, show that *B. fuelscheri* is distributed across the whole island.

Boreaphilus meybohmi

The specimens listed in section 3.3 represent the first record since the original description, which is based on a single female from the Lefka Ori (Assing 2002). They were collected together with *Tectusa callicera* and *Bellatheta albimontis*. Unlike *B. fuelscheri*, *B. meybohmi* is a local endemic, as is suggested not only from the absence of records from other mountain ranges, but also by the distintly more pronounced morphological adaptive reductions (distinctly shorter elytra, reduced coloration, smaller eyes, absence of a palisade fringe at the posterior margin of tergite VII). The previously unknown aedeagus is illustrated in Fig. 1.

Deliphrosoma fratellum

The distribution is confined to the southern Balkans and Crete, where it has been recorded only from the Psiloritis (Zerche 1991).

Lesteva longoelytrata cretica

The specimens collected in 2014 represent the first records since the original description, which is based on ten type specimens collected on "Mt. Ida" in the Psiloritis range (Lohse & Steel 1961). One of the recently collected specimens was found by floating a stream bank at 1100 m (Katharo Plateau in the Dikti range). The remaining 58 specimens were exclusively collected near snowfields both in the Psiloritis and Dikti ranges at altitudes of 1440–1830 m. Despite extensive search during three field trips to Crete, the two other endemic *Lesteva* species, *L. brondeeli* Lohse & Steel, 1961 (West Crete: Topolia) and *L. szekessyi* Lohse & Steel, 1961 (Psiloritis: Ida), were not found.

Omalium rhodicum

This recently described species was previously known only from Rhodes (Assing 2013b); the original description is based on a single male. The record from Crete reveals that the species is rather widespread in the East Mediterranean. The aedeagus of the Cretan male is illustrated in Figs. 2–5.

Brachygluta cavernosa

According to Brachat (pers. comm.), the recently discovered male (section 3.3) revealed that the female listed in Assing (2013a) as *Brachygluta* n. sp. refers to *B. cavernosa*, too.

Tychus lagrecai

The specimens listed in Assing (2013a) as *Tychus* n. sp. belong to this species (Brachat pers. comm.). The species has been recorded from both the Dikti Oros and the Psiloritis range and is thus no local endemic as indicated in Assing (2013a).

Alevonota cretica

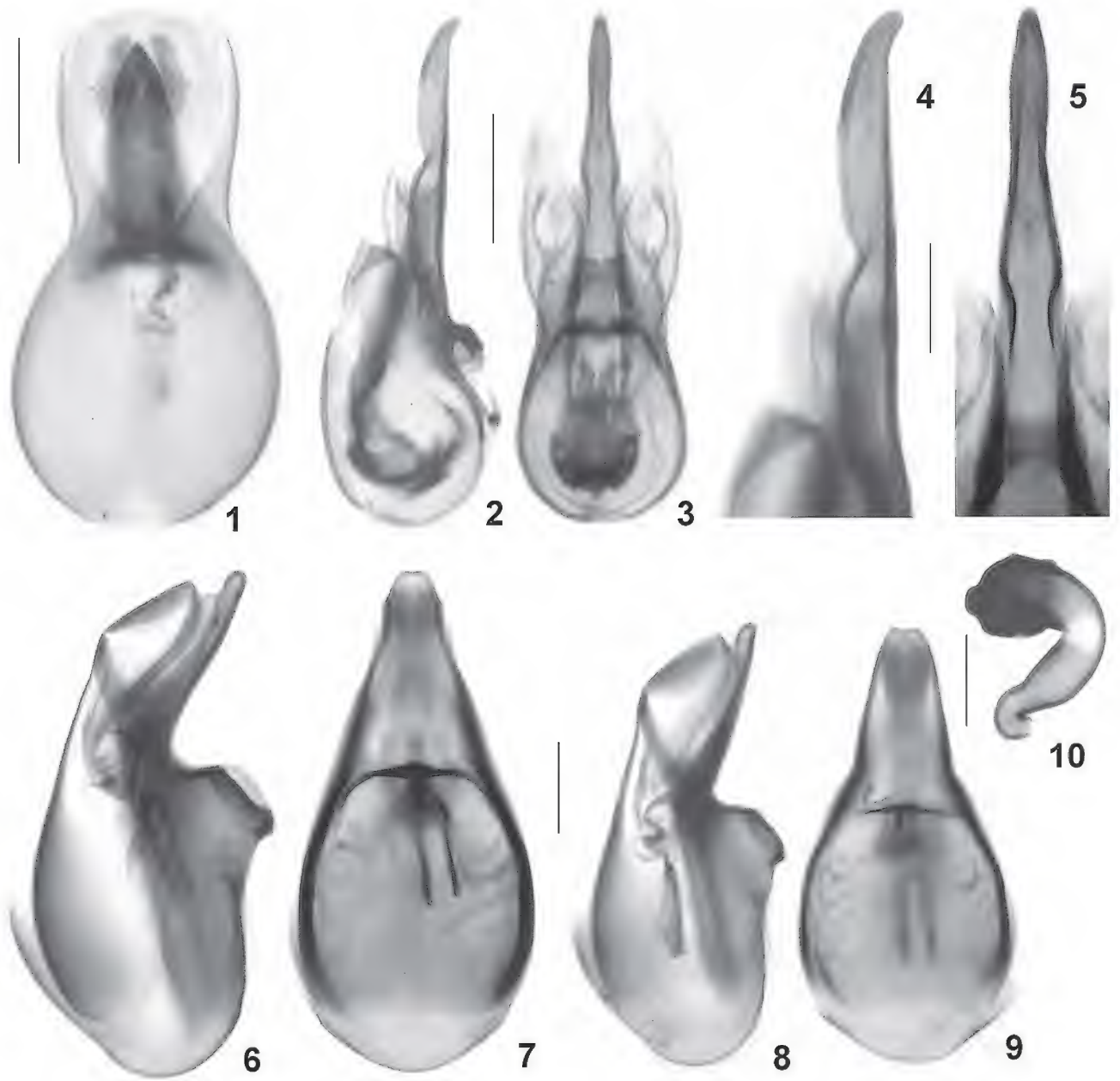
The original description of this Cretan endemic is based on type material from the Dikti Oros (Katharo Plateau, Lasithi Plateau) (Assing & Wunderle 2008). The recently collected specimens (section 3.3) represent the first record from the Orno Thriptis.

Aloconota brachyptera

This species was recently described from the Dikti and Psiloritis ranges (Assing 2013a). The specimen in section 3.3 was collected in the extreme west of Crete, which shows that *A. brachyptera* is distributed across the whole island.

Atheta luctuosa

Atheta luctuosa is widespread in the Mediterranean and has been reported also from Great Britain and Ukraine (Smetana 2004). Nevertheless, records of this species are scarce. In Crete, it was sifted in large numbers exclusively along the margins of snowfields in the Psiloritis range (section 3.3).



Figs. 1–10. *Boreaphilus meybohmi* (1), *Omalium rhodicum* from Crete (2–5), *Myrmecopora plana* (6–7), and *M. fornicata* (8–10). – **1**, **3**. Aedeagus in ventral view. **2**. Aedeagus in lateral view. **4–5**. Ventral process of aedeagus in lateral and in ventral view. **6–9**. Median lobe of aedeagus in lateral and in ventral view. **10**. Spermatheca. – Scale bars: 0.2 mm (2–3), 0.1 mm (1, 4–10).

Atheta occulta

The specimen recorded as *Atheta* sp. (sample number 4) from the Orno Thriptis by Assing (2013a) belongs to *Atheta occulta* (Erichson, 1837).

Dinusa cretica

The original description of this myrmecophile is based on two specimens from the Dikti Oros (Assing 2013a). The new records from western Crete show that it is not a local endemic, but distributed across all of Crete.

Drusilla cretica

Drusilla cretica was described from a single male collected in the Omalos Plateau in the Lefka Ori and subsequently recorded also from the Psiloritis range (Assing 2005, 2008). The most reliable character for the identifi-

cation of West Palaearctic *Drusilla* species is the shape of the spermatheca. Consequently, since no females had been available from the Lefka Ori, the possibility that the population from the Psiloritis represents a different species could not be ruled out with certainty. The new record of a male and a female from Askifou in the eastern extension of the Lefka Ori now confirms that the material from the Psiloritis range is in fact conspecific with the holotype.

Geostiba idaea

The previously known distribution was confined to the Psiloritis range (Assing 1999, 2013a). The mostly teneral specimens from Kouloukonas (sample no. 47) differ from the populations examined from the Psiloritis range by the absence of spines in the internal sac of the aedeagus. However, only one fairly mature male was available. It seems possible that the internal spines are present, but not yet fully sclerotized.

The Cretan species of the subgenus *Myrmecopora*, genus *Myrmecopora* Saulcy, 1865

Including the new species described below, the subgenus *Myrmecopora* currently contains thirteen described species, all of them associated with ants of the genus *Messor* Forel, 1890 and distributed in the East Mediterranean region (Assing 2013b). Species of this subgenus are reliably distinguished only based on the male sexual characters. Remarkably, as many as five of the species are endemic to Crete. A sixth *Myrmecopora* species recorded from Crete, the widepread *M. laesa*, belongs to a different subgenus and is a coastal species. Unfortunately, the *Messor* fauna of the East Mediterranean in general and that of Crete in particular has not been subject to a modern revision, so that explanations for the enormous diversity of Cretan *Myrmecopora* species are difficult.

The previously described Cretan representatives of the subgenus included *M. elisa* from the Dikti Oros, *M. plana* from the Lefka Ori, *M. idana* from the *Psiloritis* range, and *M. fornicata* (Assing 1997, 2013a). The original description of the latter species is based on a unique male without specified locality, so that its distribution was completely unclear. Moreover, a single female of unknown identity was recently recorded from the Orno Thripti in the extreme east of Crete (Assing 2013a).

The two field trips conducted in 2013 and 2014 have shed light on the zoogeography and taxonomy of the *Myrmecopora* species. *Myrmecopora fornicata* is in fact distributed in the lower mountain regions to the west of the Lefka Ori, in the extreme west of the island. In all, 72 specimens were found in several localities in this region. The distribution of *M. plana*, on the other hand, is confined to the Lefka Ori eastwards to the Askifou Plateau. Finally, records of males from the Orno Thripti revealed that this mountain is inhabited by a fifth locally endemic species. Thus, based on currently available evidence, all the Cretan representatives of the subgenus *Myrmecopora* have allopatric distributions and are local endemics. The sexual characters of *M. plana* and *M. fornicata* are illustrated in Figs. 6–10.

The 2014 field trip revealed that *Myrmecopora idana*, whose recent description is based on only one male, is remarkably common in the Nida Plateau, a region that had not been accessible in spring 2012 owing to a thick snow cover. In April 2014, as many as 143 specimens were collected on two days during a few hours around noon by the author alone; Paul Wunderle found nearly as many during the same period of time.

Ocalea cretica

The specimens previously (Assing 2013a) recorded from Crete as *O. badia* Erichson, 1837, all of them females, refer to *O. cretica*. The specimens collected in December 2013 (section 3.3) include males, which are externally indistinguishable from the females found in 2012. Based on photos of the aedeagus, Terlutter (pers. comm.) identified them as *O. cretica*.

Oxypoda lesbia

Oxypoda lesbia has been recorded from the Greek islands Lesbos and Rhodos, as well as from western and northern Turkey (Assing 2011, 2013b), but was previously unknown from Crete. The four females recorded from Crete as *Oxypoda* (*brachyptera* group) sp. by Assing (2013a) refer to this species.

Tectusa callicera

The specimen listed in section 3.3 was collected near the type locality, together with *Boreaphilus meybohmi* and *Bellatheta albimontis*, and represents the first record of this local endemic of the Lefka Ori since the original description (Assing 2002).

Tectusa diktiana

The type specimens of this recently described local endemic of the Dikti Oros were collected at an altitude of only 1330 m (Assing 2013a). The material from the 2014 field trip were sifted from soil and litter at the margin of a snow field at an altitude of 1830 m.

Stenus hospes

The single female recorded as *Stenus* cf. *cordatoides* in Assing (2013a) refers to *S. hospes*. The four specimens from sample 18 (section 3.3) were all collected from nests of *Messor* sp.

Astenus (Eurysunius) minos

The original description of this myrmecophilous species is based on a male holotype from "Chania" and a

female paratype from the Lefka Ori to the west southwest of Omalos (ASSING 2003). The recently collected material (section 3.3) was collected from nests of a yellowish *Tetramorium* sp. in the extreme west of Crete.

Astenus (Eurysunius) thripticus

The two females listed in section 3.3 were collected from a nest of yellowish *Tetramorium* sp. in the type locality. Extensive efforts at finding myrmecophilous *Astenus* species in the region between the Orno Thripti and the Lefka Ori (i. e., in the Dikti and Psiloritis ranges) proved unsuccessful.

Pseudobium hellenicum

Remarkably, all five specimes listed in section 3.3 and four additional specimens collected by PAUL WUNDERLE in the same locality are females. In external characters they are identical to *P. hellenicum* from the Greek mainland.

Ocypus sericeicollis

The two females recorded as *Ocypus picipennis* (Fabricius, 1792) by ASSING (2013a) belong to *O. sericeicollis*.

Quedius nemoralis Baudi, 1848
= *Quedius candicus* Coiffait, 1976: 90 ff.; **n. syn.**

Quedius candicus, whose original description is based on six type specimens from "Héraklion, Gonie" (COIFFAIT 1976), has been assumed to be endemic to Crete. A comparison of recently collected material (section 3.3; ASSING 2013a), which is in perfect agreement with the original description, as well as of previously collected specimens from Crete identified as *Q. candicus* with material of the widespread and common *Q. nemoralis* from various regions in the West Palaearctic revealed no significant differences whatsoever, neither in external nor in the male sexual characters. Moreover, the illustrations of the aedeagus provided for *Q. nemoralis* and *Q. candicus* by COIFFAIT (1978: figs. 29J–L) and COIFFAIT (1976: figs. 17–19, 1978: figs. 36A–C), respectively, are practically identical. Remarkably, COIFFAIT (1976) does not even mention *Q. nemoralis* in the diagnosis and COIFFAIT (1978) attributes both names to different species groups. In consequence, there is little doubt that both names refer to the same widespread species and *Q. candicus* is placed in synonymy with the senior name *Q. nemoralis*.

Quedius sigwalti

Based on the similar morphology of the aedeagus, this species is closely allied to the widespread and common *Q. umbrinus* Erichson, 1839. According to COIFFAIT (1978), *Q. sigwalti* differs from *Q. umbrinus* by the longer and broader elytra. However, I have seen specimens of *Q. umbrinus* with similarly shaped elytra also from southern Greece (Pelopónnisos), so that this character is not reliable. The best character for the separation of *Q. sigwalti* from *Q. umbrinus* is the constantly broader apical portion of the median lobe of the aedeagus in ventral view. The currently available evidence suggests that *Q. sigwalti* is endemic to Crete and that *Q. umbrinus* is absent from this island. The specimen recently recorded from Crete as *Q. umbrinus* in ASSING (2013a) refers to *Q. sigwalti*.

3.5 Descriptions of new species

Bellatheta albimontis **n. sp.**
(Figs. 11–19)

Type material

Holotype ♂: "GR – Crete [7a], 1590 m, SW Chania, SE Omalos 35°19′19″N, 23°55′46″E, sifted, 26.XII.2013, V. ASSING & T. FORCKE / Holotypus ♂ *Bellatheta albimontis* sp. n. det. V. ASSING 2014" (cAss).

Paratypes: 2♂♂, 1 ♀: same data as holotype (cAss).

Etymology

The specific epithet is composed of the Latin adjective albus (white) and the genitive of the Latin noun mons (mountain). It alludes to the Lefka Ori (White Mountains), where the species is probably endemic.

Description

Body length 2.2–2.5 mm; length of forebody 0.9–1.0 mm. Coloration: head and abdomen blackish-brown to blackish; pronotum and elytra brown to dark-brown; legs yellowish; antennae with antennomeres I–III yellowish and IV–XI more or less distinctly infuscate.

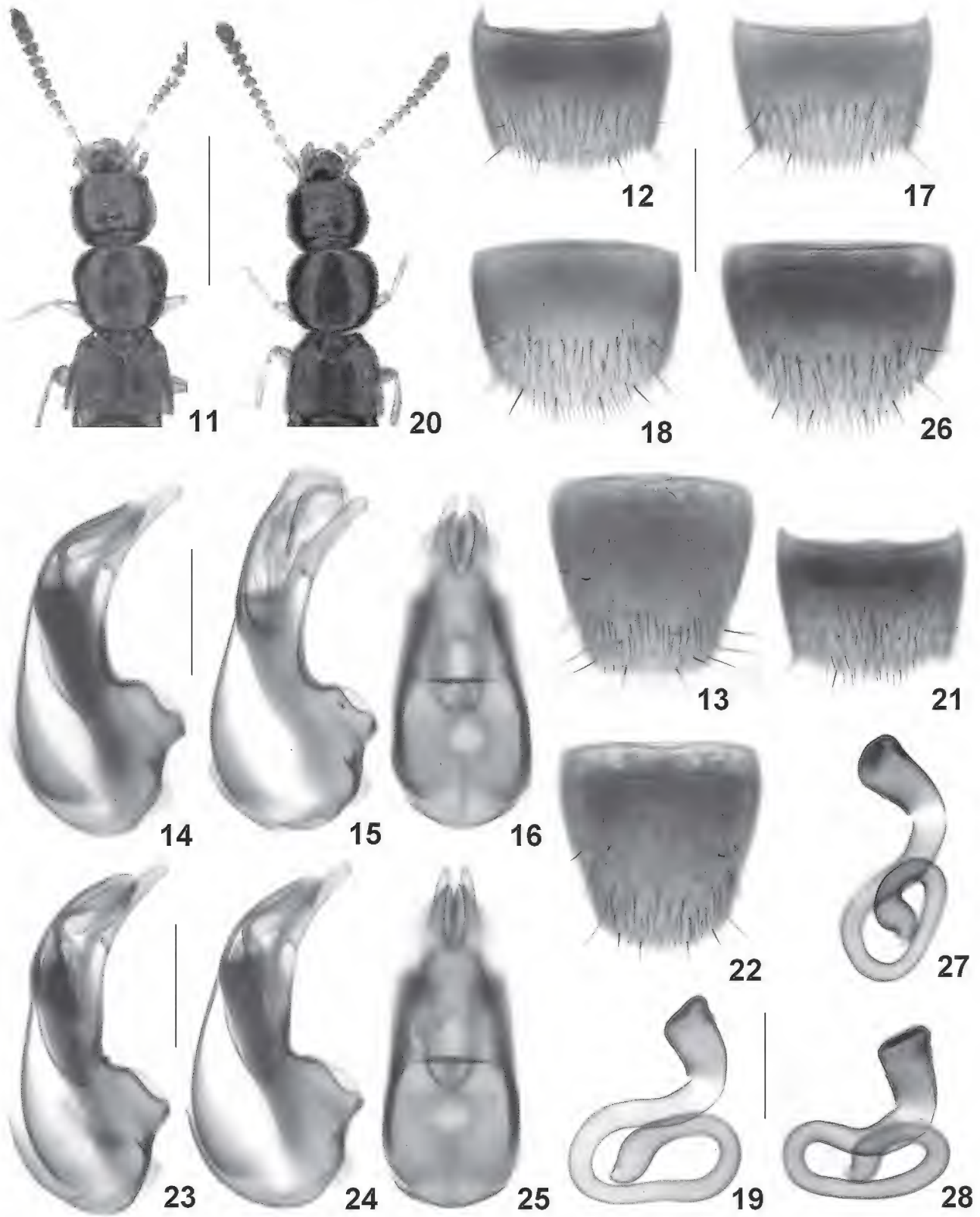
Head (Fig. 11) weakly transverse, 1.10–1.15 times as broad as long; punctation sparse and extremely fine, barely noticeable in the distinct microreticulation. Eyes small, approximately half as long as postocular region in dorsal view. Antenna approximately 0.7 mm long, distinctly incrassate apically; antennomere IV more than 1.5 times as broad as long; V–VI approximately twice as broad as long; VII–IX nearly 3 times as broad as long; X longer and broader than the preceding antennomeres, nearly 2.5 times as broad as long.

Pronotum (Fig. 11) approximately 1.05 times as broad as long and 1.05 times as broad as head, broadest near anterior angles, of trapezoid shape; punctation and microsculpture similar to those of head; pubescence directed anteriad along midline and more or less transversely laterad in lateral portions.

Elytra (Fig. 11) short, approximately 0.5 times as long as pronotum; punctation fine, but more distinct than that of head and pronotum; interstices somewhat glossy. Hind wings completely reduced.

Metatarsomere I approximately as long as II.

Abdomen 1.10–1.15 times as broad as elytra; punctation rather sparse and very fine, barely noticeable; inter-



Figs. 11–28. *Bellatheta albimontis* (11–19) and *B. idana* (20–28). – **11**, **20**. Forebody. **12**, **21**. Male tergite VIII. **13**, 22. Male sternite VIII. **14–16**, **23–25**. Median lobe of aedeagus in lateral and in ventral view. **17**. Female tergite VIII. **18**, **26**. Female sternite VIII. **19**, **27–28**. Spermatheca. – Scale bars: 0.5 mm (11, 20), 0.2 mm (12–13, 17–18, 21–22, 26), 0.1 mm (14–16, 19, 23–25, 27–28).

stices with distinct microreticulation; posterior margin of tergite VII with very narrow and indistinct rudiment of a palisade fringe.

♂: posterior margin of tergite VIII broadly convex (Fig. 12); sternite VIII (Fig. 13) longer than tergite VIII, posterior margin somewhat produced, very weakly convex, nearly truncate; median lobe of aedeagus (Figs. 14–16) approximately 0.3 mm long; ventral process deeply bifid apically in ventral view, smoothly curved in lateral view.

♀: tergite VIII (Fig. 17) strongly convex in the middle; sternite VIII (Fig. 18) transverse, slightly longer than tergite VIII, and with broadly convex posterior margin; spermatheca as in Fig. 19.

Comparative notes

The genus *Bellatheta* Roubal, 1928 is discontinuously distributed across the Palaearctic regions. Seven species were previously known from Europe and the Mediterranean. Except for the winged and moderately widespread *B. fatrica* Roubal, 1928 (distributed in the Balkans, Italy, and Central Europe) and *B. palata* (Benick, 1970) (distributed in Greece and Bulgaria), the species are micropterous and locally endemic in mountain ranges of Spain [*B. aragonica* (Assing, 2001)], Italy [*B. kappi* (Assing, 2002), *B. rosai* (Pace, 1978)], Lebanon [*B. besucheti* (Pace, 1982)], and Greece [*B. renominata* (Likovský, 1984)]. The genus was previously unknown from Crete. *Bellatheta albimontis* is distinguished from *B. renominata*, the only other micropterous congener known from Greece (Kefallinía) by the posteriorly nearly truncate male sternite VIII, the less slender median lobe of the aedeagus (ventral view) with a more strongly curved ventral process (lateral view), as well as by the much longer spermathecal duct. For illustrations of the sexual characters of *B. renominata* see Assing (2001).

Distribution and natural history

The type locality is situated to the southeast of Omalos in the Lefka Ori, where the species is probably endemic. The specimens were sifted from litter near and under snow beneath bushes at an altitude of 1590 m, together with the locally endemic *Boreaphilus meybohmi* and *Tectusa callicera*.

Bellatheta idana **n. sp.**
(Figs. 20–28)

Type material

Holotype ♂: "GR – Crete [17], Psiloritis, SW Anogia, Mygerou Refuge, 1670 m, sifted, 35°14′11″N, 24°46′55″E, 13.IV.2014, V. Assing / Holotypus ♂ *Bellatheta idana* sp. n. det. V. Assing 2014" (cAss).

Paratypes: 2♂♂, 5♀♀: same data as holotype (cAss); 1♂, 1♀: "GR – Crete [18], Psiloritis, SW Anogia, Mygerou Refuge, 1700 m, sifted, 35°14′09″N, 24°47′00″E, 13.IV.2014, V. Assing" (cAss).

Etymology

The specific epithet is an adjective derived from Ida, the name of the highest mountain in the Psiloritis range.

Description

Posterior margin of tergite VIII usually without, rarely with, narrow rudiment of a palisade fringe. External characters (Fig. 20), except for the less distinctly trapezoid shape of the pronotum, as in *B. albimontis*.

♂: posterior margin of tergite VIII broadly and rather weakly convex (Fig. 21); sternite VIII (Fig. 22) longer than tergite VIII, posterior margin convex; median lobe of aedeagus (Figs. 23–25) approximately 0.3 mm long; ventral process deeply bifid apically in ventral view, somewhat angled in the middle in lateral view.

♀: tergite VIII broadly convex; sternite VIII (Fig. 26) transverse, slightly longer than tergite VIII, and with broadly convex posterior margin; spermatheca similar to that of *B. albimontis*, its shape subject to pronounced intraspecific variation (Figs. 27, 28).

Comparative notes

Bellatheta idana is distinguished from the highly similar *B. albimontis* primarily by the male primary and secondary sexual characters. The male sternite VIII is distinctly convex posteriorly (nearly truncate in *B. albimontis*) and the ventral process is somewhat angled in lateral view (smoothly curved in *B. albimontis*).

Distribution and natural history

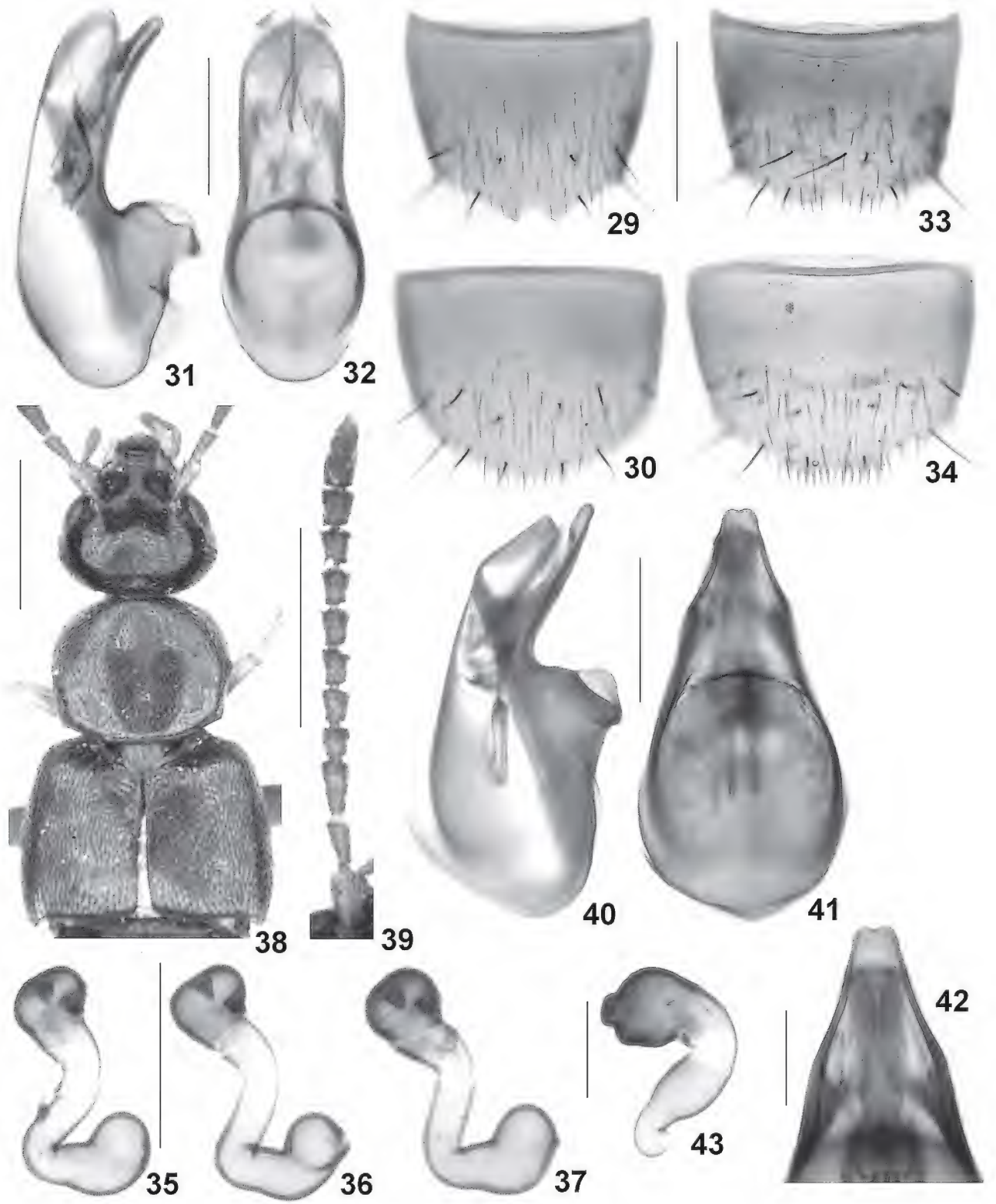
The type specimens were collected near the Mygerou Refuge in the Psilorits range, where this species is presumably endemic. They were sifted from litter and soil along the margins of snowfields at an altitude of 1670–1700 m.

Geostiba (Sipalotricha) paulexsecta **n. sp.**
(Figs. 29–37)

Type material

Holotype ♂: "GR – Crete [18], Psiloritis, SW Anogia, Mygerou Refuge, 1700 m, sifted, 35°14′09″N, 24°47′00″E, 13.IV.2014, V. Assing / Holotypus ♂ *Geostiba paulexsecta* sp. n. det. V. Assing 2014" (cAss).

Paratypes: 2♂♂: same data as holotype (cAss); 1♀: same data, but leg. Wunderle (cWun); 1♀: "GR – Crete [17], Psiloritis, SW Anogia, Mygerou Refuge, 1670 m, sifted, 35°14′11″N, 24°46′55″E, 13.IV.2014, V. Assing" (cAss); 27♂♂, 38♀♀: "GR – Crete [24], Psiloritis, ca. 8 km SSW Zoniana, 35°13′45″N, 24°48′10″E, 1730 m, snowfields, 15.IV.2014, V. Assing" (cAss, MNHUB); 31♂♂, 29♀♀: same data, but leg. Wunderle (cWun).



Figs. 29–43. *Geostiba paulexsecta* (29–37) and *Myrmecopora thriptica* (38–43). – **29**. Male tergite VIII. **30**. Male sternite VIII. **31–32**, **40–41**. Median lobe of aedeagus in lateral and in ventral view. **33**. Female tergite VIII. **34**. Female sternite VIII. **35–37**, **43**. Spermatheca. **38**. Male forebody. **39**. Male antenna. **42**. Ventral process of aedeagus in ventral view. – Scale bars: 0.5 mm (38–39), 0.2 mm (29–30, 33–34, 40–41), 0.1 mm (31–32, 35–37, 42–43).

Etymology

The specific epithet is an adjective composed of the Latin adverb paulum (barely, slightly) and the past participle of the Latin verb exsecare (to excise). It alludes to the small and shallow posterior excision of the male tergite VIII.

Description

Body length 2.2–2.8 mm; length of forebody 0.9–1.1 mm. Coloration: body yellowish-red to reddish, with the head often slightly darker and abdominal segments V–VII more or less extensively infuscate; legs yellowish; antennae brown, with antennomeres I–II yellowish.

External characters as in other Cretan *Sipalotricha* species; distinguished only by the sexual characters.

♂: tergite VIII (Fig. 29) with small and shallow posterior excision; sternite VIII as in Fig. 30; median lobe of aedeagus (Figs. 31, 32) approximately 0.27 mm long, without spines in internal sac.

♀: posterior margin of tergite VIII with weakly pronounced median concavity (Fig. 33); sternite VIII as in Fig. 34, median portion of posterior margin with stout marginal setae; spermatheca with distal portion of capsule moderately dilated and proximal portion of somewhat variable shape (Figs. 35–37).

Comparative notes

Seven locally endemic species of the subgenus *Sipalotricha* Scheerpeltz, 1931 were previously known from Crete, two from the Lefka Ori and their eastern extensions, two from the Dikti Oros, one from the Orno Thriptis, and two, *G. exsecta* Assing, 1999 and *G. idaea* Pace, 1996, from the Psiloritis range (Assing 2013a). The new species is distinguished from the latter as follows:

– from *G. exsecta* by the much smaller and shallower posterior excision of the male tergite VIII, the slightly smaller median lobe of the aedeagus (*G. exsecta*: approximately 0.3 mm), with a less pronounced crista apicalis and a broader ventral process in ventral view, the less broad posterior concavity of the female tergite VIII, and the slightly different shape of the spermatheca;

– from *G. idaea* by the narrower, deeper, and more defined posterior excision of the male tergite VIII, the absence of spines in the internal sac of the aedeagus, the more pronounced median concavity of the posterior margin of the female tergite VIII, and by the slightly different shape of the spermatheca.

For illustrations of the sexual characters of *G. exsecta* and *G. idaea* see Assing (1999).

Distribution and natural history

The known distribution of *G. paulexsecta* is confined to two localities in the Psiloritis range. The specimens were sifted from litter and soil at the margins of snowfields at altitudes of 1670–1730 m.

Myrmecopora (Myrmecopora) thriptica **n. sp.**
(Figs. 38–43)

Type material

Holotype ♂ [with a worker of *Messor* sp. attached to the pin]: "GR – Crete [11], Orno Thriptis, E Thripti, 35°05′34″N, 25°52′41″E, 970 m, under stones, 10.IV.2014, V. Assing / Holotypus ♂ *Myrmecopora thriptica* sp. n. det. V. Assing 2014" (cAss).

Paratypes: 2♂♂, 4♀♀: same data as holotype (cAss); 1 ♂, 2 ♀♀: "GR – Crete [5], Orno Thriptis, SE Thripti, 35°05′07″N, 25°52′59″E, 1300 m, under stones, 8.IV.2014, V. Assing" (cAss); 1 ♀: "GR – Crete [2], Thriptis Mt., SE Thripti, 1250 m, 35°05′07″N, 25°52′58″E, under stones, 25.III.2012, V. Assing" (cAss); 1 ♂: "GR – Crete [3], Orno Thriptis, E Thripti, 35°05′34″N, 25°52′41″E, 970 m, under stones, 7.IV.2014, Wunderle" (cWun); 1 ♀: same data, but "… [3b] … 8.IV.2014" (cWun); 1 ♂: same data, but "… [11a] … 11.IV.2014" (cWun).

Etymology

The specific epithet (adjective) is derived from Orno Thriptis, the name of the mountain where the species was discovered and where it appears to be endemic.

Description

Body length 3.2–4.0 mm; length of forebody 1.4–1.7 mm. Coloration: head dark-brown; pronotum and elytra brown; abdomen blackish-brown, with the anterior segments and the apex slightly paler; legs yellowish-brown; antennae dark-reddish, with antennomeres I–II somewhat paler.

Head (Fig. 38) strongly transverse and wedge-shaped, 1.20–1.25 times as broad as long; punctation moderately dense and very fine, more distinct in male than in female; interstices with shallow microsculpture. Eyes approximately as long as postocular region in dorsal view. Antenna (Fig. 39) 1.2–1.3 mm long, slightly longer in male than in female; antennomere III slightly more than twice as long as broad, longer than II; IV–X oblong, but less than 1.5 times as long as broad, more oblong in male than in female; XI slender, approximately as long as the combined length of IX and X.

Pronotum (Fig. 38) 1.25–1.30 times as broad as long and 1.10–1.15 times as broad as head; punctation dense and fine.

Elytra (Fig. 38) 0.90–0.95 times as long as pronotum; posterior margin sinuate near postero-lateral angles; punctation fine and dense. Hind wings fully developed.

Legs very long and slender; metatarsus almost as long as metatibia; metatarsomere approximately as long as the combined length of II–IV.

Abdomen narrower than elytra; punctation fine, but distinct, somewhat denser on anterior than on posterior tergites; interstices glossy; posterior margin of tergite VII with palisade fringe.

♂: head in postero-median portion with pronounced impression (Fig. 38); pronotum broadly impressed along midline (Fig. 38); posterior margins of tergite VIII and

sternite VIII broadly convex; median lobe of aedeagus (Figs. 40, 41) 0.57–0.58 mm long; ventral process rather broad basally and weakly excised apically in ventral view (Fig. 42).

♀: head without impression; pronotum with narrow and shallow impression along midline; spermatheca as in Fig. 43.

Comparative notes

The new species is distinguished from the four previously known Cretan representatives of the subgenus *Myrmecopora* as follows:

– from *M. elisa* (Dikti range), its geographically closest consubgener, by on average smaller body size and by the differently shaped ventral process of the aedeagus in ventral view;

– from *M. idana* (Psiloritis range) by shorter and less slender antennae with less oblong antennomeres IV–X and by the apically less abruptly narrowed ventral process of the aedeagus in ventral view;

– from *M. plana* (Lefka Ori) by the shorter and less slender antennae (*M. plana*: antennomeres IV–X almost twice as long as broad), the more pronounced and more extensive impressions on the male head and pronotum, and by the shape of the ventral process of the aedeagus (*M. plana*: ventral process slightly shorter, basally narrower in ventral view);

– from *M. fornicata* (extreme west of Crete) by the shorter and less slender antennomeres with distinctly less oblong antennomeres IV–X, the more distinct and extensive impressions on the male head and pronotum, by the distinctly larger median lobe of the aedeagus (*M. fornicata*: approximately 0.5 mm), and by the shape of the ventral process of the aedeagus, particularly in ventral view.

For illustrations of the sexual characters of the compared species see Figs. 6–10 and Assing (1997, 2013a).

Distribution and natural history

Myrmecopora thriptica is currently known only from the Orno Thriptis, where it is probably endemic. The specimens were found in nests of *Messor* sp. under stones at the margin of a moist pasture and beside a pista at altitudes of 970–1300 m.

Sunius thripticus **n. sp.**
(Figs. 44–48)

Type material

H o l o t y p e ♂: "GR – Crete [11a], Orno Thriptis, E Thripti, 35°05′34″N, 25°52′41″E, 970 m, under stones, 11.IV.2014, V. Assing / Holotypus ♂ *Sunius thripticus* sp. n. det. V. Assing 2014" (cAss).

P a r a t y p e s: 1 ♀: same data, but "… [3] … 7.IV.2014" (cAss); 1 ♀: same data, but "… [11] … 10.IV.2014" (cAss).

Etymology

The specific epithet (adjective) is derived from Orno Thriptis, the mountain where the type locality is situated.

Description

Body length 2.6–2.8 mm; length of forebody 1.3–1.4 mm. External characters (Fig. 44) as in *S. diktianus* Assing, 2013.

♂: sternite VII unmodified; sternite VIII (Fig. 49) with indistinct median elevation with denser pubescence, posterior excision small and broadly triangular; aedeagus (Figs. 46, 47) 0.36 mm long; internal sac with series of a few sclerotized spines of different lengths, the larger ones stout and broad-based (Fig. 48).

Comparative notes

As can be inferred from the extremely similar external and particularly the highly similar male sexual characters, *S. thripticus* is closely allied to, most likely the adelphotaxon of, *S. diktianus* from the Dikti Oros, the only other representative of the *S. seminiger* group known from Crete. Both species are reliably distinguished merely by the shapes of the internal spines of the aedeagus, which are stouter and broad-based in *S. thripticus* and slender in *S. diktianus*. For illustrations of *S. diktianus* see Assing (2013a).

Distribution and natural history

Sunius thripticus is probably endemic to the Orno Thripti, eastern Crete, which is separated from the Dikti Oros (where *S. diktianus* is distributed) by a deep valley of little more than 100 m altitude at its highest point. The specimens were collected from under stones in a moist pasture with *Juncus* at an altitude of nearly 1000 m. Despite extensive efforts on five days using various methods, Paul Wunderle and I found only three specimens. The type locality is identical to that of *Myrmecopora thriptica* and *Astenus thripticus*.

Quedius praecisus **n. sp.**
(Figs. 49–59)

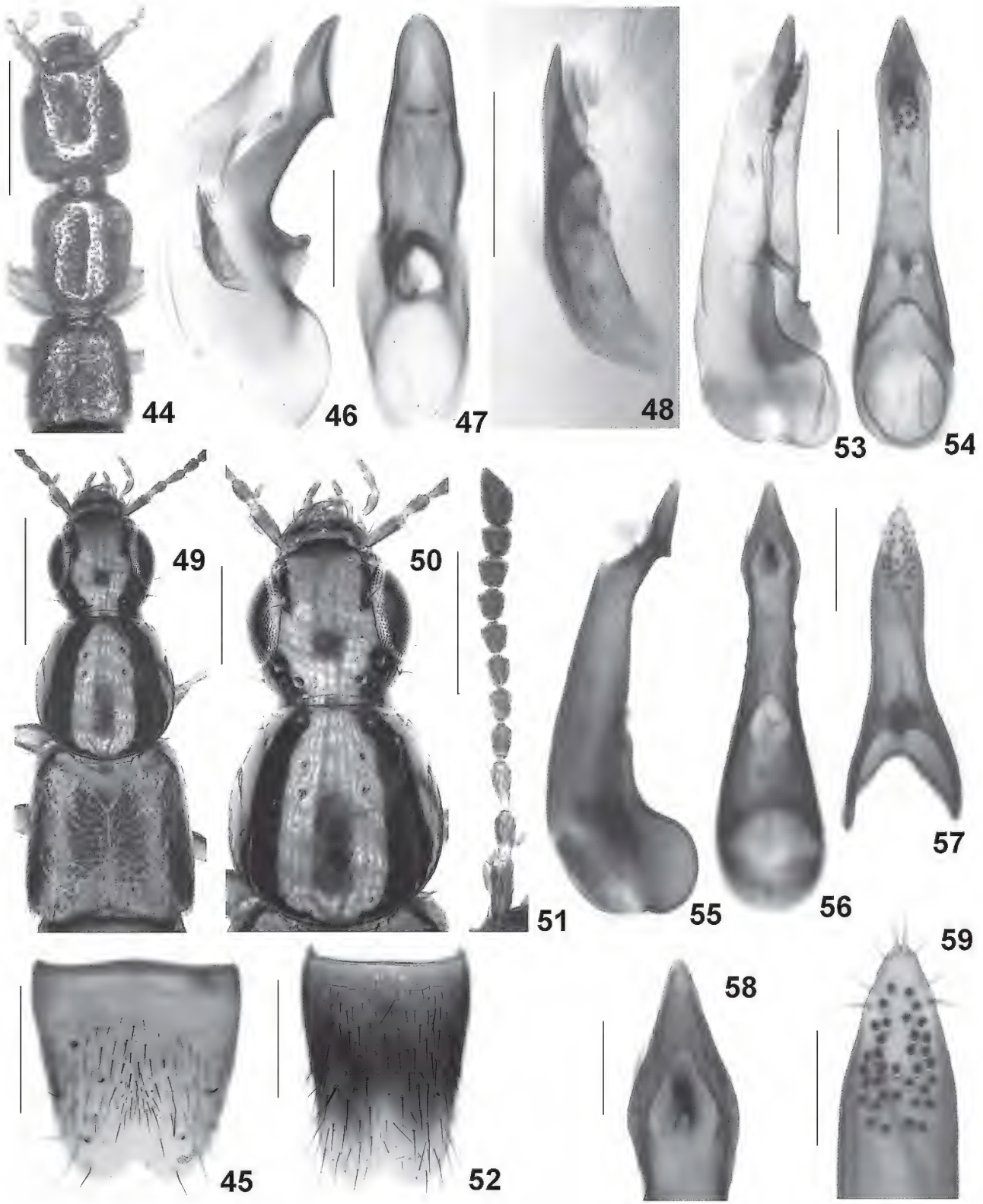
Type material

H o l o t y p e ♂: "GR – Crete [3a], Orno Thriptis, E Thripti, 35°05′34″N, 25°52′41″E, 970 m, soil sifted, 7.IV.2014, V. Assing / Holotypus ♂ *Quedius praecisus* sp. n. det. V. Assing 2014" (cAss).

P a r a t y p e s: 1 ♂: same data as holotype (cAss); 1 ♂: "GR – Crete [3], Orno Thriptis, E Thripti, 35°05′34″N, 25°52′41″E, 970 m, under stones, 7.IV.2014, V. Assing" (cAss); 1 ♂: "GR – Crete [4], Orno Thriptis, E Thripti, SE Thripti, 1130 m, sifted, 35°05′16″N, 25°52′58″E, 7.IV.2014, V. Assing" (cAss).

Etymology

The specific epithet is the past participle of the Latin verb praecidere (to shorten) and alludes to the short paramere (in relation to the median lobe).



Figs. 44–59. *Sunius thripticus* (44–48) and *Quedius praecisus* (49–59). – **44, 49**. Forebody. **45, 52**. Male sternite VIII. **46–47**, **53–54**. Aedeagus in lateral and in ventral view. **48**. Internal structures of aedeagus in lateral view. **50**. Head and pronotum. **51**. Antenna. **55–56**. Median lobe of aedeagus in lateral and in ventral view. **57**. Paramere. **58**. Apex of median lobe of aedeagus in ventral view. **59**. Apex of paramere. – Scale bars: 1.0 mm (49), 0.5 mm (44, 50–52), 0.2 mm (45, 53–57), 0.1 mm (46–47, 58–59), 0.05 mm (48).

Description

Body length 7.0–7.5 mm; length of forebody 3.3–3.5 mm. Forebody as in Fig. 49. Coloration: head and pronotum blackish; elytra blackish, with the humeral and lateral portions extensively and the posterior margin narrowly yellowish; abdomen blackish, with the posterior margins of segments VII and VIII pale-reddish; legs dark-yellowish; antennae blackish-brown to blackish, with the base of antennomere II reddish and antennomere III partly or completely reddish to brown.

Head shaped as in Fig. 50; dorsal surface with fine transverse microsculpture. Antenna (Fig. 51) 1.6–1.7 mm long.

Pronotum (Fig. 50) 1.00–1.05 times as long as broad and approximately 1.25 times as broad as head; lateral margins smoothly convex in dorsal view; microsculpture similar to that of head.

Elytra (Fig. 49) of somewhat variable length, 0.67–0.77 times as long as pronotum; punctation rather dense; interstices approximately as broad as, or slightly broader than, diameter of punctures. Hind wings fully developed.

Abdomen anteriorly with dense, posteriorly with sparser fine punctation; interstices with extremely fine and shallow, barely noticeable microsculpture; posterior margin of tergite VII with palisade fringe.

♂: posterior excision of sternite VIII rather broadly triangular and not very deep (Fig. 52); aedeagus (Figs. 53–59) approximately 0.85 mm long; paramere rather short, far from reaching apex of median lobe; median lobe apically acutely spear-shaped in ventral view and with pronounced subapical tooth; paramere apically with a cluster of numerous black peg-setae.

Comparative notes

Based on the extremely similar external characters (coloration, size, punctation, microsculpture) and on the general morphology of the aedeagus, *Q. praecisus* is closely allied to the widespread *Q. nemoralis*, from which it is reliably distinguished only by the morphology of the aedeagus, particularly the relatively shorter paramere and the shape of the apex of the median lobe. Among the illustrations provided by Coiffait (1978), the aedeagus of *Q. praecisus* most resembles those given for *Q. josue* Saulcy, 1865 (and *Q. troodites* Fagel, 1968; a junior synonym of *Q. josue*) from the Middle East and Cyprus, which differs from *Q. praecisus* by distinctly larger body size (no overlap), the coloration (*Q. josue*: antennomeres I–III more or less completely reddish-yellow; elytra more extensively yellowish to reddish), and the morphology of the aedeagus (much more robust; median lobe almost straight in lateral view and broader in ventral view).

Distribution and natural history

The known distribution is confined to the Orno Thriptis in the extreme east of Crete. However, the fully developed wings suggest that the species is distributed across the whole island, possibly also in neighbouring islands such as Karpathos. Three of the type specimens were sifted from leaf litter, grass roots, and soil, and one was collected from under a stone in a moist pasture with *Juncus* and on a slope with oak trees at altitudes of 970 and 1130 m. The type locality is identical to that of *Myrmecopora thriptica*, *Sunius thripticus*, and *Astenus thripticus*.

Xantholinus erinaceus **n. sp.**
(Figs. 60–63)

Type material

Holotype ♂: "GR – Crete [20], NW Perama, 35°24′39″N, 24°40′45″E, 10 m, ruderal river bank, 14.IV.2014, V. Assing / Holotypus ♂ *Xantholinus erinaceus* sp. n. det. V. Assing 2014" (cAss).

Paratypes: 1 ♂, 1 ♀ [slightly teneral]: same data as holotype (cAss, MNHUB); 1 ♂: "GR – Crete [2], 20 km SW Chania, 1040 m, NE Omalos, 35°21′01″N, 23°54′35″E, 24.XII.2013, V. Assing & T. Forcke" (cAss); 1 ♂: "GR – Crete [12], 760 m, 17 km S Kissamos, 35°20′22″N, 23°39′45″E, pasture, 29.XII.2013, V. Assing & T. Forcke" (cAss); 1 ♀: "GR – Crete [9a], Chania, 35°30′40″N, 23°59′51″E, 1 m, sandy beach, 31.XII.2013, leg. Forcke" (MNHUB); 1 ♀: "GR – Crete [11], 880 m, Askifou → Asigonia, 35°14′56″N, 24°13′36″E, u. stones, 28.XII.2013, V. Assing & T. Forcke" (MNHUB); 4 ♂♂, 3 ♀♀: "GR: Crete [2] Rethymn.: ca. 1,5 km S Kanevos, Kotsifos cleft, 440 m, 35°13′36N, 24°24′00E, 20.X.2006, M. Schülke" (cSch, cAss); 4 ♂♂: "Kreta: Ierapetra, 15.IV.–13.V.1971, Malicky" (MNHUB).

Etymology

The specific epithet (Latin: hedgehog) is a noun in apposition and alludes to the numerous conspicuously long spines in the internal sac of the aedeagus.

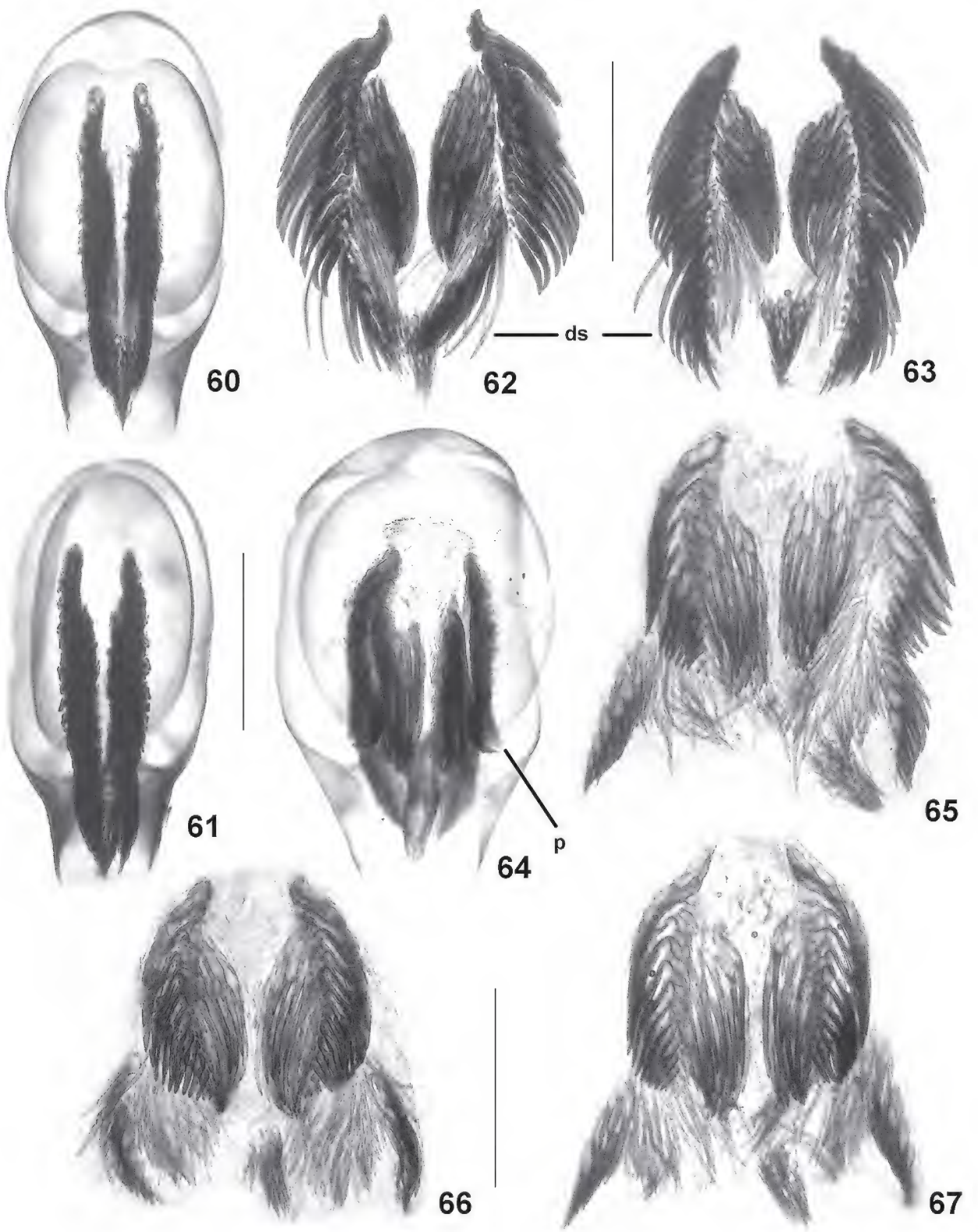
Description

Body length 9.0–11.5 mm; length of forebody 4.9–5.5 mm. Coloration: body black with reddish elytra; legs reddish; antennae dark-brown with antennomeres I–II(III) at least partly reddish. External characters as in *X. rufipennis* Erichson, 1839; distinguished only by the internal structures of the aedeagus.

♂: aedeagus approximately 1.2 mm long; shape and internal structures as in Figs. 60–63.

Comparative notes

As can be inferred from the similar arrangement of the internal spines of the aedeagus, *X. erinaceus* is closely related to the externally indistinguishable *X. rufipennis*, a widespread and rather common species in the East Mediterranean region. In order to assess the internal structures of the aedeagus of both species, the aedeagi were dissected, and the internal structures were extracted and squeezed, so as to allow full visibility of all the spines. A systematic comparison of the type material of *X. erinaceus* with males of *X. rufipennis* from various localities



Figs. 60–67. *Xantholinus erinaceus* (60–63) and *X. rufipennis* (64–67). – **60–61**, **64**. Aedeagus in dorsal view of holotype (60), male from Omalos (61), lectotype (64). **62–63**, **65–67**. Internal structures of aedeagus in squeeze preparation of males from Kanevos (62), Omalos (63), Karpathos (65), Israel (66), and Rhodos (67). – Abbreviations: ds = distal series; p = lateral projection. – Scale bars: 0.5 mm.

in the East Mediterranean from Albania to Israel, including several Greek islands (Karpathos, Rhodos, Naxos, Paros, Lesbos) and Cyprus (partly listed in ASSING 2007), revealed that the spines of *X. erinaceus*, particularly those in the distal portion (ds in Figs. 62, 63) of the aedeagus, are longer and more slender (for illustrations of *X. rufipennis* see Figs. 65–67). Moreover, the orientation of the series of spines in the aedeagus is somewhat different, even if one accounts for some variability and the fact that the position of the spine series in the aedeagus is not fixed. In *X. rufipennis*, the series are shorter (Fig. 64) and the proximal series of long spines usually face laterad in the middle (p in Fig. 64) in normal position, which is not the case in *X. erinaceus*. Based on an examination of eight males of *X. erinaceus* (the aedeagi of the four males from Ierapetra are too bleached to fully assess their internal structures) and numerous males of *X. rufipennis*, these differences appear to be constant, suggesting that, unlike those from neighbouring islands such as Karpathos, the Cretan populations have been isolated long enough to evolve into a distinct species (or subspecies). There are numerous other examples of Crete hosting endemic species that are similar and closely related to widespread taxa in Staphylinidae, e. g., *Alevonota cretica*, *Atheta cretica*, *Boreaphilus fuelscheri*, *Dinusa cretica*, *Lesteva longoelytrata cretica*, *Pronomaea wunderlei*, *Quedius sigwalti*, and *Xantholinus minos*.

Distribution and natural history

The distribution of *X. erinaceus* is confined to Crete, where it was found both in the east and in the west. The material was collected from under stones in pastures, on a ruderal river bank, and on a sandy beach from sea-level up to 1040 m altitude. Two specimens found in April are slightly teneral.

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Studies on *Stiliderus* Motschulsky and *Stilicoderus* Sharp: biogeographical notes and descriptions of new species (Coleoptera: Staphylinidae: Paederinae)

Guillaume de Rougemont

Abstract

The following 22 new species are described and named: *Stilicoderus aerosoides* **n. sp.**, *S. baliemensis* **n. sp.**, *S. batantaensis* **n. sp.**, *S. cephalicus* **n. sp.**, *S. continentalis* **n. sp.**, *S. kolaensis* **n. sp.**, *S. lastianus* **n. sp.**, *S. laticeps* **n. sp.**, *S. lobatus* **n. sp.**, *S. maritimoides* **n. sp.**, *S. meraukeanus* **n. sp.**, *S. obesus* **n. sp.**, *S. papuanus* **n. sp.**, *S. riedelianus* **n. sp.**, *S. riedeli* **n. sp.**, *S. sarahae* **n. sp.**, *S. sepikensis* **n. sp.**, *Stiliderus agostii* **n. sp.**, *S. brendellianus* **n. sp.**, *S. germanus* **n. sp.**, *S. rugulosicollis* **n. sp.** and *S. tengah* **n. sp.** Another three species (*Stilicoderus* sp. X, *Stiliderus* sp. Y and *Stiliderus* sp. Z) are described to enable differentiation from other members of the aerosus group, but not named for want of males. *Stilicoderus pendleburyi* Cameron 1950 **n. syn.** is placed in synonymy with *Stilicoderus fenestratus* Fauvel 1895. New country records are given for eleven other species. A summary of the distribution of species groups, particularly in biogeographical sub-regions known for high rates of endemicity, is presented.

Keywords: *Stiliderus*, *Stilicoderus*, new species, biogeography.

Zusammenfassung

Die folgenden 22 neuen Arten werden beschrieben: *Stilicoderus aerosoides* **n. sp.**, *S. baliemensis* **n. sp.**, *S. batantaensis* **n. sp.**, *S. cephalicus* **n. sp.**, *S. continentalis* **n. sp.**, *S. kolaensis* **n. sp.**, *S. lastianus* **n. sp.**, *S. laticeps* **n. sp.**, *S. lobatus* **n. sp.**, *S. maritimoides* **n. sp.**, *S. meraukeanus* **n. sp.**, *S. obesus* **n. sp.**, *S. papuanus* **n. sp.**, *S. riedelianus* **n. sp.**, *S. riedeli* **n. sp.**, *S. sarahae* **n. sp.**, *S. sepikensis* **n. sp.**, *Stiliderus agostii* **n. sp.**, *S. brendellianus* **n. sp.**, *S. germanus* **n. sp.**, *S. rugulosicollis* **n. sp.** und *S. tengah* **n. sp.** Weitere drei Arten (*Stilicoderus* sp. X, *Stiliderus* sp. Y und *Stiliderus* sp. Z) werden beschrieben, um die Trennung von anderen Mitgliedern der aerosus-Gruppe zu ermöglichen, aber sie werden aufgrund der noch unbekannten Männchen nicht benannt. *Stilicoderus pendleburyi* Cameron 1950 **n. syn.** ist ein neues Synonym von *Stilicoderus fenestratus* Fauvel 1895. Neue Verbreitungsangaben werden für weitere elf Arten gemacht. Die Verbreitung von Artengruppen wird erläutert, speziell in solchen zoogeographischen Regionen, die für ihren Endemismus bekannt sind.

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1 Introduction

The taxonomy of the species of the two Oriental genera *Stiliderus* Motschulsky 1858 and *Stilicoderus* Sharp 1889 was extensively reviewed by the author in a series of nine papers published between 1985 and 1996 (Rougemont 1985a, b, 1986a–e, 1995, 1996), in which 69 of the taxa known to date were described as new. In 2002 Shibata described another new species of *Stilicoderus* from Taiwan; in 2012 Assing transferred a species described as *Rugilus* to *Stilicoderus* and in 2013a, 2013b, 2014 described a further 21 and synonymised two species. Together with the species described and synonymised in this paper, the total number of valid taxa of these two genera is now 157.

In an earlier paper (Rougemont 1996: 713) I explained why I continue to regard these two genera as distinct taxa, after following Blackwelder's synonymy in the two parts of the revision (Rougemont 1986a, b), and Assing (2012, 2013a, b) has taken the same view. The true generic status of such aberrant groups as the Australian aberrans group and the Papuan funebris group, and of those groups of species of "*Stiliderus*" lacking a cephalic infraorbital ridge, remains to be resolved: it may be that bi-lobed 4th tarsomeres have evolved more than once in this lineage, and that the latter species groups may eventually have to be assigned to *Stilicoderus*.

Substantial additional material of these insects from the Asian continent and the Sunda Islands (Sumatra, Java,

Borneo, Bali and Lombok) in various collections (SMNS, MHNG, NHMW, and from my own prospections in China and SE Asia) examined after 1986 contained few new species, but extended the known ranges of many others; this appeared gratifying in that it suggested that the enumeration of the fauna of these regions was already fairly complete by the time the last of the earlier papers had been published, but in recent papers Assing (2013a, 2013b, 2014) has described more species, particularly from China. Other areas, particularly Sulawesi (Celebes) and the Papuan region (including the Moluccas whence not species had been recorded before Assing 2014 described four new species) continue to reveal more new than known species.

Aedoeagus: The aedoeagus of members of these two genera consists of a median lobe, a usually but not invariably symmetrical median structure called "paramere" in the two parts of the revision (Rougemont 1986a, b) and "ventral blade" in subsequent papers including the present one, which is attached by its base to the ventral face of the median lobe in front of the basal foramen, and in *Stilicoderus* species a pair of usually symmetrical lateral structures termed the "parameroid lobes"; these are totally exposed in some species, or have their bases more or less extensively concealed by the dorsal plate of the median lobe in others. In addition the aedoeagus has a number of large single and paired sclerotised internal structures that may be extruded during copulation (cf. *Stilicoderus discalis* Fauvel 1895, Rougemont 1986a: figs. 18b, c). These and other internal structures were not, or only partially illustrated in some cases in earlier papers, although they would undoubtedly provide valuable specific diagnostic characters, because the external structures of the aedoeagus have so far proven sufficient for the purpose of identification.

Acronyms

CRO	Collection Guillaume de Rougemont (currently housed in the OUMNH)
CVA	Collection Volker Assing, Hannover, Germany
MHNG	Muséum d'Histoire Naturelle, Geneva, Switzerland
NHMW	Naturhistorisches Museum, Vienna, Austria
NHRS	Naturhistoriska Riksmuseet, Stockholm, Sweden
OUMNH	University Museum of Natural History, Oxford, England
SMNS	Staatliches Museum für Naturkunde, Stuttgart, Germany
ZMAN	Zoölogisch Museum, Amsterdam, The Netherlands

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Specimens from the Danum Valley in the OUMNH were collected with permission from the Danum Valley Management Committee and the Economic Planning Unit of the Prime Minister's Department under Permit No. EPU Ruj. EPE 40/200/19 ST issued to Dr. Eleanor Slade and project number 224 under the Royal Society SEARRP.

2 Methods

As in my previous papers on this group, measurements other than those given in mm (total body length) were made with an eye-piece micrometer at ×80 magnification on a VMZ 1×4× binocular microscope with eye-piece micrometer, so the units are equal to 12.5 µ. The length of the head does not include the labrum; the breadth of head, unless otherwise stated, is measured at the widest point, just behind the posterior margins of the eyes and does not include the eyes; the length of elytron is the maximum length, not the length of suture.

The photographs of whole insects and of the aedoeagi were made in the laboratory of the OUMNH, using a Leica DFC 490 digital camera linked to a Leica M165C microscope and Helicon Focus version 5.3.11 software.

3 Systematic list and descriptions of new taxa

3.1 *Stilicoderus* Sharp

hieroglyphicus group

Assing (2014) has remarked that the hieroglyphicus and aerosus groups are probably not distinct phyletic groups. However they are, so far as is known, distinguishable, and since "species groups" are not taxa, I continue to use them in this paper for the sake of convenience.

Most members of the endemic Papuan hieroglyphicus group are very similar and can only be determined by examination of the aedoeagus, which provides clear and reliable characters in all cases. The colour of the legs can be of some help in separating species, being entirely testaceous or rufo-testaceous in some species or with fuscous femora in others. The shape of the male 8th abdominal sternite is scarcely differentiated from one species to another, the posterior margin being broadly and very shallowly emarginate. In addition to the eleven new species of this group described below, I have seen about a dozen others from the same collections which I leave unrecorded and undescribed for want of males.

Stilicoderus laticeps **n. sp.**

Holotype (♂): Irian Jaya, Sorong Prov., Batanta Island, Waylebet, 800 m, sifted, 29.X.1996, leg. A. Riedel (NHMW).

Paratypes: 17♂♂/♀♀, same data as holotype (12 exx. NHMW, 5 exx. CRO).

Description

Body length ca. 4.5 mm. Proportions of holotype: length of head: 65; breadth of head: 73; diameter of eye: 28; length of antenna: 135; length of pronotum: 61; breadth of pronotum: 56; length of elytron: 73; breadth of elytra: 71; metatibia: 67; metatarsus: 40.

Colour and sculpture as in *S. hieroglyphicus*, the femora testaceous like the tibia.

Male: abdominal sternites as in *S. hieroglyphicus*, the apical margin of abdominal sternite VIII very shallowly and broadly excised. Aedoeagus see Fig. 1.

Differential diagnosis

This new species can only be separated with certainty from *S. hieroglyphicus* and many congeners by the conformation of the aedoeagus. It is readily identified by the shape of the lateral lobes and the long, slender asymmetrical apex of the ventral blade (Fig. 1). Externally it can only be distinguished from *S. hieroglyphicus* by its narrower pronotum and elytra, which make the head appear considerably broader. In this it is similar to *S. cephalicus* n. sp. described below.

Stilicoderus riedeli **n. sp.**

Holotype (♂): Irian Jaya, Sorong Prov., Batanta Island, 10 m, sifted, 30.X.1996, leg. A. Riedel (NHMW).

Paratypes: 18 exx., same data as holotype; 5 exx., same locality and collector as holotype, but 150 m, 2.XI.1996; 2 exx., Irian Jaya, Sorong Prov., Salawatti Island, Solol, 200–300 m, 6.–7.XI.1996, sifted, leg. A. Riedel (20 exx. NHMW, 5 exx. CRO).

Description

Body length ca. 4.1 mm. Proportions of holotype: length of head: 51; breadth of head: 65; diameter of eye: 24; length of antenna: 105; length of pronotum: 59; breadth of pronotum: 51; length of elytron: 67; breadth of elytra: 65; metatibia: 58; metatarsus: 35.

In colour, facies, sculpture etc. similar to *S. hieroglyphicus* and its allies, the legs entirely testaceous, but smaller than any species of this group described so far.

Male: abdominal sternites as in *S. hieroglyphicus*. Aedoeagus see Fig. 2.

Differential diagnosis

S. riedeli is distinguished from all other members of the hieroglyphicus group by its small size and by the conformation of the ventral blade and spatulate parameroid lobes of the aedoeagus. It inhabits the same island as the similar species *S. laticeps*, described above, but was taken at lower altitudes.

Stilicoderus cephalicus **n. sp.**

Holotype (♂): Irian Jaya, Sorong Prov., Waigeo Island, Kabui Bay, Wawaiay, 50 m, 14.XI.1996, leg. A. Riedel (NHMW).

Description

Body length 4.5 mm. Proportions of holotype: length of head: 65; breadth of head: 75; diameter of eye: 28; length of antenna: 130; length of pronotum: 65; breadth of pronotum: 58; length and breadth of elytra: 71; metatibia: 73; metatarsus: 38.

In all essentials except the elytral sculpture this species is similar to *S. hieroglyphicus* and its allies, but in the relative proportions of head, pronotum and elytra it most closely resembles *S. laticeps*, described above.

Male: abdominal sternites as in *S. hieroglyphicus*. Aedoeagus see Fig. 3, with very convoluted parameroid lobes.

Differential diagnosis

The elytral sculpture differs from that of species hitherto described in the hieroglyphicus group: the small setiferous granules that form the ground sculpture of elytra in these species is obsolescent in *S. cephalicus*, the granules flattened and leaving the surface much more shiny than in related species. The aedoeagus, as in other species, is characteristic.

Stilicoderus obesus **n. sp.**

Holotype (♂): Irian Jaya, Jayawijaya Prov., Samboka, upper Kolff River, ca. 200 m, 10.–14.X.1996, sifted, leg. A. Riedel (NHMW).

Description

Body length 6 mm. Proportions of holotype: length of head: 85; breadth of head: 92; diameter of eye: 33; length of antenna: 187; length of pronotum: 84; breadth of pronotum: 79; length of elytron: 90; breadth of elytra: 95; metatibia: 84; metatarsus: 51.

Colour as in *S. hieroglyphicus*: pitchy black, elytra pitchy brown, antennae, palpi and legs dark reddish brown.

Male: apical margin of sternite VIII more deeply and less broadly excised than in related species. Aedoeagus see Fig. 4, very large, over 1 mm long, the ventral blade constricted into a very slender apex concealed between the apices of the broad parameroid lobes.

Differential diagnosis

This new species belongs unequivocally in the hieroglyphicus group, yet is larger than any species of the group described hitherto, and is also distinctive by virtue of its elytral sculpture.

S. obesus n. sp. differs from *S. hieroglyphicus* Fauvel and other members of the group in several respects: greater size, head less transverse and narrower in propor-

tion to pronotum and elytra, the minute, scarcely visible, lateral denticles of the labrum, and the elytral sculpture: the minute granules of the ground sculpture in this species have coalesced to form mostly longitudinal or diagonal vermiculate rugae; at low (×30–×40) magnification these rugae have the appearance of matted recumbent pubescence; the large foveate punctures of the elytra are obsolescent, obscured by the vermiculate/granulose punctuation. Two other, undescribed, species in NHMW respectively from Sorong Province and Fakfak Province are of comparable large size but differ in their more usual type of elytral sculpture.

Stilicoderus kolaensis **n. sp.**

Holotype (♂): Indonesia, Maluc., Aru Isls, Kola Isl., Wafan, 27.VIII.[19]91, Agosti F91969, "2" (MHNG).

Paratypes: 1♂, 2♀♀, same data as holotype (2 exx. MHNG, 1 ex. CRO).

Description

Body length 3.8–4.1 mm. Proportions of holotype: length of head: 58; breadth of head: 63; diameter of eye: 24; length of antenna: 105; length of pronotum: 60; breadth of pronotum: 52; length of elytron: 68; breadth of elytra: 65; metatibia: 59; metatarsus: 40.

Pitchy black, elytra somewhat paler, dark brown, legs entirely testaceous, palpi and antennae testaceous to rufo-testaceous.

Male: sternite VIII not emarginate, the posterior margin merely slightly concave. Aedoeagus see Fig. 5, the apex of the median lobe and apices of lateral lobes explanate in lateral view, strongly compressed in ventral view.

Differential diagnosis

One of the smallest members of the group, in size comparable to *S. riedeli* n. sp. and *S. laticeps* n. sp. described above. This new species differs from *S. hieroglyphicus* by its smaller size and transverse head with distinct apico-lateral angles. From *S. laticeps* n. sp. it differs by its even smaller size and less transverse head. It is externally indistinguishable from *S. riedeli*. From these and all other species it is clearly distinguished by the aedoeagus (Fig. 5).

Remark

S. kolaensis is the first member of the genus recorded from the Aru islands, where it is probably endemic.

Stilicoderus sepikensis **n. sp.**

Holotype (♂): Papua New Guinea, West Sepik, Vanimo, Denake Range, km 12, 28.–29.X.1992, leg. A. Riedel (SMNS).

Paratypes: 5♂, 2♀♀, same data as holotype (5 exx. SMNS, 2 exx. CRO).

Description

Body length 3.7–4 mm. Proportions of holotype: length of head: 54; breadth of head: 58; diameter of eye: 24; length of antenna: 105; length of pronotum: 54; breadth of pronotum: 50; length of elytron: 65; breadth of elytra: 60; metatibia: 55; metatarsus: 35.

Pitchy black, palpi, antennae and legs rufo-testaceous, the femora infuscate.

Male: posterior margin of sternite VIII broadly and shallowly concave. Aedoeagus see Fig. 6.

Differential diagnosis

This is another very small species, distinguished from the two species above and from *S. riedeli* n. sp. by the less transverse head with more rounded, less pronounced apico-lateral angles and by the dark femora, and from all other species by the aedoeagus.

Stilicoderus riedelianus **n. sp.**

Holotype (♂): Papua New Guinea, West Sepik, Vanimo, Denake Range, km 12, 28.–29.X.1992, leg. A. Riedel (SMNS).

Paratype: 1♂, same data as holotype (CRO).

Description

Body length 4 mm. Proportions of holotype: length of head: 55; breadth of head: 63; diameter of eye: 26; length of antenna: 114; length of pronotum: 67; breadth of pronotum: 53; length of elytron: 70; breadth of elytra: 65; metatibia: 60; metatarsus: 36.

Pitchy black, palpi antennae and legs rufo-testaceous, meso- and metafemora infuscate, profemora less so. Head strongly transverse, the temples fairly evenly rounded from the posterior margin of eyes to the base.

Male: sternite VIII as in the preceding species. Aedoeagus see Fig. 7.

Differential diagnosis

This small species is externally only distinguishable from *S. riedeli* n. sp. described above by the dark meso- and metafemora.

Stilicoderus lobatus **n. sp.**

Holotype (♂): Papua New Guinea, West Sepik, Vanimo, Denake Range, km 12, 28.–29.X.1992, leg. A. Riedel (SMNS).

Paratype: 1♂, same data as holotype (CRO).

Description

Body length 4.3–4.5 mm. Proportions of holotype: length of head: 52; breadth of head: 64; diameter of eye: 26; length of antenna: 127; length of pronotum: 60; breadth of pronotum: 53; length of elytron: 72; breadth of elytra: 67; metatibia: 61; metatarsus: 31.

Pitchy black, the elytra slightly paler, brownish, in holotype; labrum dark brown; mouthparts, antennae and legs rufo-testaceous, all femora infuscate. Head slightly transverse, appearing more so due to prominent eyes, the temples fairly strongly convergent before apico-lateral angles.

Male: sternite VIII as in preceding species. Aedoeagus see Fig. 8, the apex of ventral blade fairly narrow, curving dorsad and concealed in lateral view by the parameroid lobes, the latter remarkably developed into laterally projecting lobes in ventral view.

Differential diagnosis

This new species is readily distinguishable from the syntopic *S. riedelianus* n. sp. and *S. maritimoides* n. sp. and from *S. riedeli* n. sp. and *S. meraukeanus* n. sp. described below by its greater size. In size and proportions it more closely resembles the allopatric species *S. kaiensis* Rougemont 1996, and *S. laticeps* n. sp. but differs in its less transverse head. From all other species it differs in the conformation of the aedoeagus.

Stilicoderus maritimoides **n. sp.**

Holotype (♂): Papua New Guinea, West Sepik, Vanimo, Denake Range, km 12, 28.–29.X.1992, leg. A Riedel (SMNS).

Description

Body length ca. 4.2 mm. Proportions of holotype: length of head: 57; breadth of head: 62; diameter of eye: 22; length of antenna: 105; length of pronotum: 59; breadth of pronotum: 52; length of elytron: 70; breadth of elytra: 65; metatibia: 58; metatarsus: 37.

Pitchy black, labrum dark brown, mouthparts, antennae and legs rufo-testaceous, the femora infuscate but reddish-brown near apices.

Male: sternite VIII as in other closely related species. Aedoeagus see Fig. 9.

Differential diagnosis

This new species, named in allusion to a slight similarity in the conformation of the aedoeagus, does not otherwise resemble *S. maritimus* (see Rougemont 1986b) closely, being a smaller insect in all its proportions. Of the species of similar small size it differs from *S. kolaensis* n. sp. and *S riedeli* n. sp. in its dark femora, and from *S. laticeps* n. sp. in the dark femora and narrower head. It is externally virtually indistinguishable from *S. sepikensis* n. sp., *S. riedelianus* n. sp. and *S. peninsularis* Rougemont except, as from all other species, by the conformation of the aedoeagus.

Stilicoderus meraukeanus **n. sp.**

Holotype (♂): Irian Jaya, Merauke, Senggo, trail to Abau, ca. 100 m, 15.–17.VI.1994, leg. A. Riedel (SMNS).

Paratype: 1 ♂, same data as holotype (CRO).

Further material: 1 ♀, same data as holotype (SMNS).

Description

Body length ca. 4 mm. Proportions of holotype: length of head: 60; breadth of head: 65; diameter of eye: 26; length of antenna: 115; length of pronotum: 60; breadth of pronotum: 65; length of elytron: 75; breadth of elytra: 62; metatibia: 61; metatarsus: 35.

Pitchy black, labrum brown, mouthparts, antennae and legs rufo-testaceous, the femora slightly infuscate, the profemora less so.

Male: aedoeagus see Fig. 10, the ventral blade slender in both ventral and lateral views, curved dorsad and longer than the parameroid lobes which are not notably explanate laterally.

Differential diagnosis

S. meraukeanus n. sp. is virtually indistinguishable from other members of the hieroglyphicus group of comparable small size (*S. kolaensis*, *S. riedeli*, *S. riedelianus*, *S. sepikensis* and *S. peninsularis* Rougemont 1985) except in the conformation of the aedoeagus.

Remark

The single associated female is doubtfully attributed to the new species because it differs slightly from the males in its slightly greater size and broader head, and in the slightly less dense puncturation and granulation of the elytra.

Stilicoderus batantaensis **n. sp.**

Holotype (♂): Irian Jaya, Sorong Prov., Batanta Island, Waylebet, 150 m, 2.XI.1996, sifted, leg. A. Riedel (SMNS).

Paratypes: 4 exx., same data as holotype (3 exx. SMNS, 1 ex. CRO).

Description

Body length 4.2 mm. Proportions of holotype: length of head: 59; breadth of head: 66; diameter of eye: 23; length of antenna: 110; length of pronotum: 58; breadth of pronotum: 51; length of elytron: 69; breadth of elytra: 67; metatibia: 60; metatarsus: 38.

Black, labrum reddish brown, mouthparts and antennae rufo-testaceous, legs entirely pale testaceous.

Male: sternites as in *S. kolaensis* n. sp. and many other members of the hieroglyphicus group. Aedoeagus see Figs. 10Xa, b. The male paratype shows a bifurcate, pincer-like process at the tip of the median lobe (visible in Fig. 10X); this is in fact a sclerotised extrusion from the median lobe. In lateral view the aedoeagus is identical to that of the holotype.

Differential diagnosis

Stilicoderus batantaensis n. sp. species is externally almost indistinguishable from *S. kolaensis* n. sp. except for its slightly finer elytral ground puncturation with fewer larger punctures which are more scattered, less clearly aligned in longitudinal rows, but the aedoeagi of the two species are quite different. Both species are probably endemic on their respective islands; Batanta lies off the north western tip of New Guinea, and Kola is about 700 km away in the Aru archipelago.

aerosus group

In contrast to the hieroglyphicus group, the appendages of the aedoeagi of members of this group are very similar, rather variable within species according to the position in which the ventral blade and parameroid lobes lie in relation to the median lobe, and do not always provide clear diagnostic characters; also the colour of elytra and legs is variable in some species, whereas the size, proportions and pubescence differ markedly between allopatric series which probably represent distinct species. For these reasons it has proven difficult to decide on the taxonomic status of these forms.

Key to the known species of the aerosus group from New Guinea

Stilicoderus caprarius Assing 2013 and *S. acutissimus* Assing 2013, which are recorded as belonging to this group, are not included in the key because they were not seen; in any case the figures the author gives of the aedoeaegi (which, with their symmetrical median- and parameroid lobes look like those of the hieroglyphicus group) clearly show that they do not belong to any of the species listed below.

1 Body entirely pitchy-black; granulation of elytra evident on entire surface. **2**
– Fore-body brown at least in parts; granulation of elytra evident on whole surface or obsolescent at least on disc. **4**
2 Head scarcely transverse, sub-orbicular (Rougemont 1986a: fig. 4H). – Pronotum elongate. Aedoeagus see Rougemont 1986a: fig. 4A. ..... ***solitarius*** Last
– Head clearly transverse, with distinct posterior angles..... **3**
3 Head more strongly transverse (Rougemont 1986a: fig. 5H); pronotum short, slightly transverse; puncturation of head and pronotum coarser, granulation of pronotum and elytra coarser and sparser, the entire fore-body distinctly shiny. Aedoeagus see Rougemont 1986a: fig. 5A, the apices of parameriod lobes slightly recurved ventrad. .... ***lasti*** (Rougemont)
– Head longer, less transverse; pronotum elongate; puncturation of head much finer and closer, the entire fore-body dull. Aedoeagus see Fig. 11, the parameroid lobes asymmetrical, their apices sinuate, upturned before apical declivous hook. ..... ***lastianus*** **n. sp.**
4 Head, including eyes, broader than elytra; smaller species, ca. 4.8 mm long. – Aedoeagus see Fig. 14.... ***papuanus*** **n. sp.**
– Head, including eyes, narrower than, or at most as broad as elytra; larger species, 5.0–6.4 mm long. **5**
5 Elytra shiny, devoid of granules, the puncturation coarse and irregular, the large punctures grouped here and there in twos or threes in longitudinal pit-like depressions, the surface of disc almost glabrous, with sparse pubescence only evident on sides. – Aedoeagus see Fig. 13. ..... ***aerosoides*** **n. sp.**
– Elytra less shiny, with granules evident at least in anterior and posterior angles, the puncturation less coarse and more regular. **6**
6 Elytra entirely covered in small granules; fore-body, and especially elytra clothed in very evident pale recumbent pubescence. – Aedoeagus see Rougemont 1986a: figs. 3A, 3a. ..... ***aerosus*** Last
– Granules obsolescent on disc of elytra, only clearly evident in anterior and posterior areas; pubescence much less evident on elytra. **7**
7 Larger species, ca. 6.2 mm long (see proportions in description, below) [male unknown]. ..... **sp. X**
– Smaller species, ca. 5 mm long (see proportions, below). – Aedoeagus see Fig. 12. ..... ***baliemensis*** **n. sp.**

Stilicoderus aerosus Last

Stilicoderus aerosus Last 1984: 114.
Stiliderus aerosus: Rougemont 1986a: 154.

13 exx., Indonesia, Papua, Star Mountains, Abmisibil 1950–2200 m, 4°38′S 143°7′E, 29.I.–09.II.2005, dist. mtn. rainforest. sifted, leg. T. Lackner; 5 exx., Indonesia, Papua, Kecamatan Nipsan, Walmak, 1800–2000 m, 4°07′S 139°38′E, 10.–17.II.2005, dist. mtn. rainforest, sifted, leg. T. Lackner (13 exx. ZMAN, 5 exx. CRO).

Remark

These new records considerably extend the known range of this species, from Okapa District in Papua New Guinea to the Star Mountains of Irian Jaya.

Stilicoderus lastianus **n. sp.**

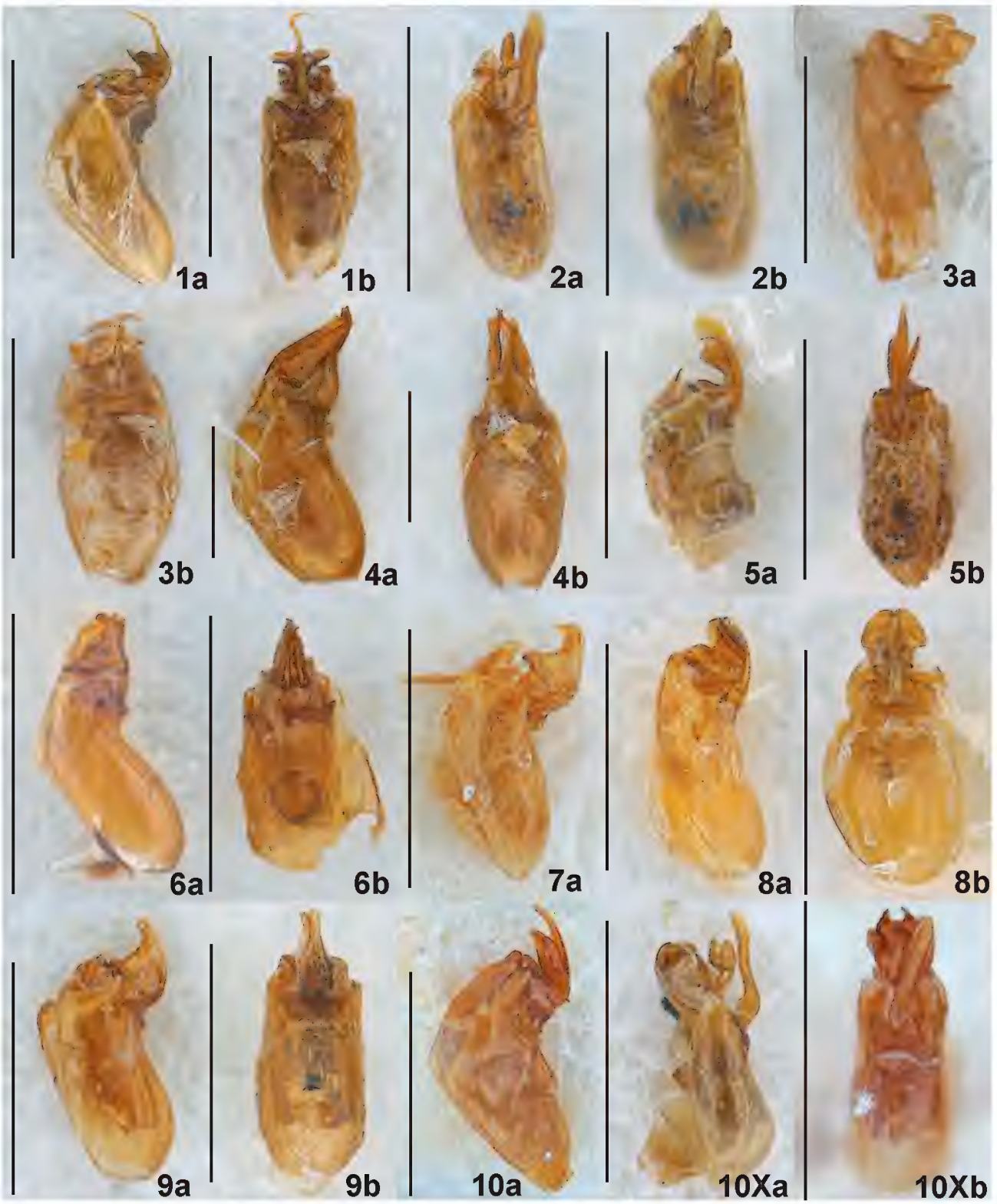
Holotype (♂): Irian Jaya, Jayawijaya, Borme, 1000–1300 m, 13.–18.VIII.1992, leg. A Riedel (SMNS).

Paratypes: 3 ♀♀, same data as holotype (2 exx. SMNS, 1 ex. CRO).

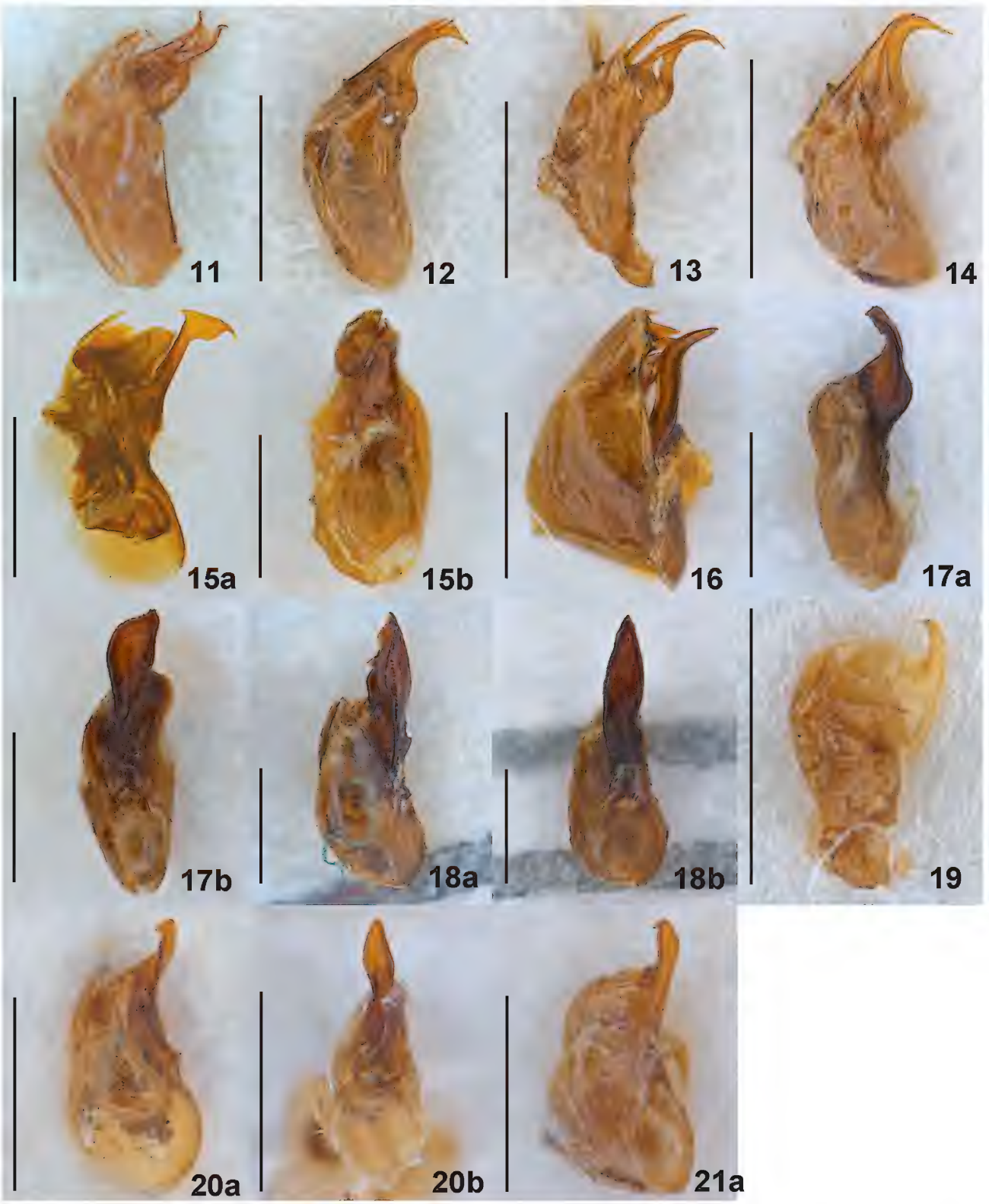
Description

Body length 5.2 mm. Proportions of holotype: length of head: 75; breadth of head: 81; diameter of eye: 29; length of antenna: 155; length of pronotum: 75; breadth of pronotum: 70; length of elytron: 92; breadth of elytra: 83; metatibia: 78; metatarsus: 44.

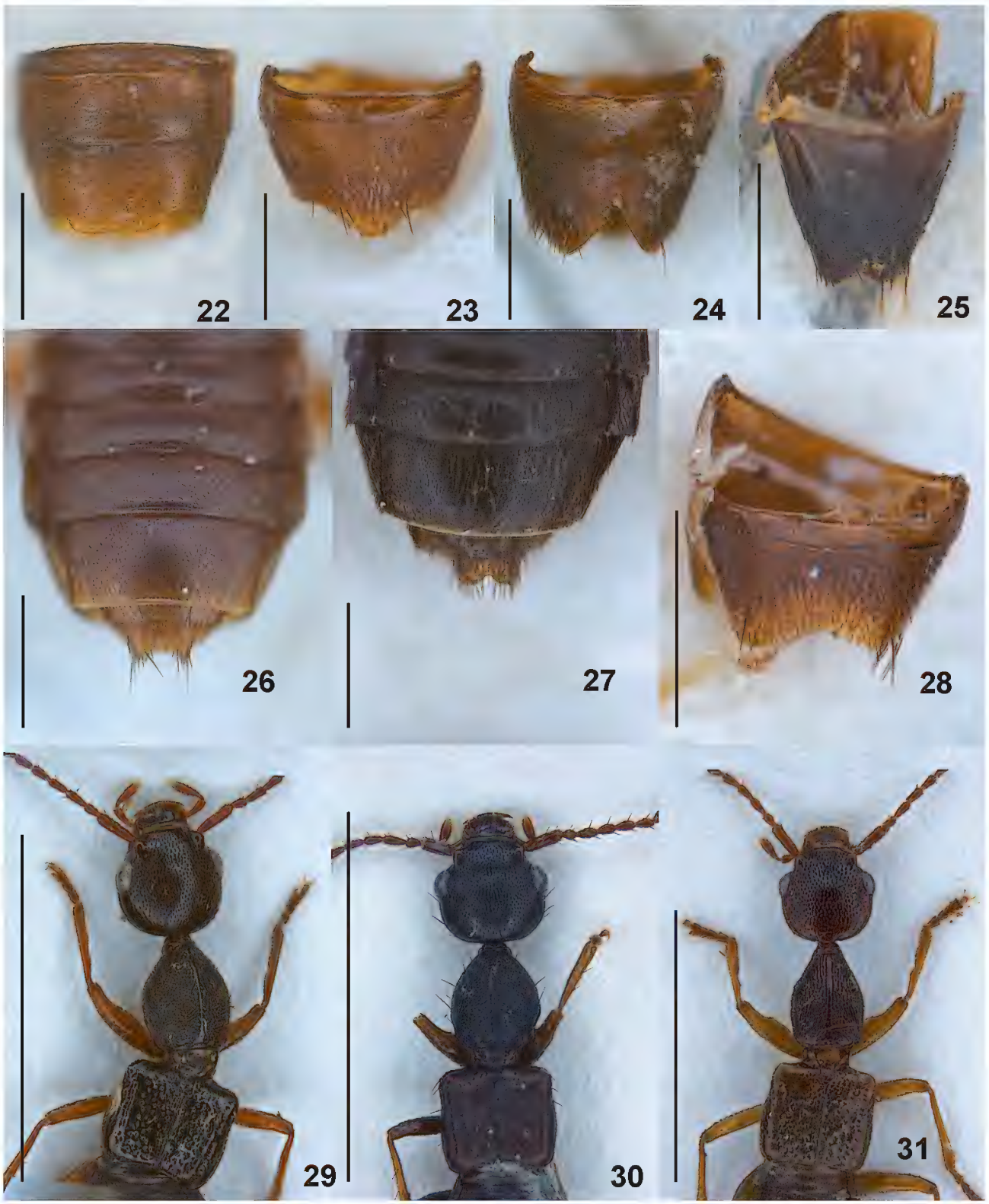
Black, the appendages dark reddish, the femora and especially meso- and metafemora more or less infuscate. Head distinctly transverse, with short, scarcely visible erect pubescence; puncturation of head very dense, the punctures slightly elongate especially posteriorly, on frons about the diameter of eye-facets; labrum tridentate, the outer teeth much broader and longer than the median tooth; pronotum



Figs. 1–10X. *Stilicoderus* spp., aedoeagi in lateral (a) and ventral (b) views. – **1**. *S. laticeps* n. sp. **2**. *S. riedeli* n. sp. **3**. *S. cephalicus* n. sp. **4**. *S. obesus* n. sp. **5**. *S. kolaensis* n. sp. **6**. *S. sepikensis* n. sp. **7**. *S. riedelianus* n. sp. **8**. *S. lobatus* n. sp. **9**. *S. maritimoides* n. sp. **10**. *S. meraukeanus* n. sp. **10X**. *S. batantaensis* n. sp. – Scales: 0.5 mm.



Figs. 11–21. *Stilicoderus* and *Stiliderus* spp., aedoeagi in lateral (a) and ventral (b) views. – **11**. *Stilicoderus lastianus* n. sp. **12**. *Stilicoderus baliemensis* n. sp. **13**. *Stilicoderus aerosoides* n. sp. **14**. *Stilicoderus papuanus* n. sp. **15**. *Stilicoderus continentalis* n. sp. **16**. *Stilicoderus sarahae* n. sp. **17**. *Stiliderus tengah* n. sp. **18**. *Stiliderus germanus* n. sp. **19**. *Stiliderus rugulosicollis* n. sp. **20**. *Stiliderus brendellianus* n. sp. **21**. *Stiliderus agostii* n. sp. – Scales: 0.5 mm.



Figs. 22–31. *Stilicoderus* and *Stiliderus* spp., male sternites VI, VII (22), female sternite XIII (23), male sternite VIII (24, 25, 28), female tergite X (26, 27), fore-body (29–31). – **22**. *Stilicoderus papuanus* n. sp. **23**. *Stilicoderus* sp. X. **24**. *Stilicoderus sarahae* n. sp. **25**. *Stiliderus germanus* n. sp. **26**. *Stiliderus brendellianus* n. sp. **27**. *Stiliderus* sp. Z. **28**. *Stiliderus agostii* n. sp. **29**. *Stiliderus* sp. Z. **30**. *Stiliderus agostii* n. sp. **31**. *Stiliderus rugulosicollis* n. sp. – Scales: 0.5 mm (22–28), 3 mm (29–31).

apparently glabrous, sculpture of pronotum densely granulose, homogeneous, without trace of a median impunctate line; elytra with sparse, long, semi-recumbent pale pubescence, the large foveate punctures numerous, roughly aligned longitudinally in posterior two thirds smaller and more confused anteriorly, the interstices entirely and densely covered in dense granulose puncturation.

Male: 8th sternite with a scarcely discernable small shallow emargination. Aedoeagus see Fig. 11, the tips of parameroid lobes characteristically hook-shaped.

Differential diagnosis

In colour this new species most closely resembles *S. solitarius* Last from which it differs by its more transverse head and other proportions, its more densly granulose elytra, and the aedoeagus.

Stilicoderus baliemensis **n. sp.**

Holotype (♂): Irian Jaya, Jayawijaya, Wamena, Jiwika, 2300 m, 29.IX.1992, leg. A. Riedel (SMNS).

Paratypes: 3♀♀, Irian Jaya, Jayawijaya, Duirema, 1900–2100 m, 9.–11.IX.1992, leg. A. Riedel (2 exx. SMNS, 1 ex. CRO).

Description

Body length ca. 5 mm. Proportions of holotype: length of head: 78; breadth of head: 75; diameter of eye: 27; length of antenna: 148; length of pronotum: 76; breadth of pronotum: 63; length of elytron: 100; breadth of elytra: 85; metatibia: 74; metatarsus: 46.

Head and pronotum black, elytra brown, abdomen fuscous, the apex of 7th sternite and 8th and 9th sternites brown; palpi and antennae dark reddish brown, legs darker brown. Head slightly transverse, the sides retracted but with well marked postero-lateral angles; puncturation of head not particularly close, the punctures elongate, the interstices coalescing in parts into longitudinal rugae; head covered in evident recumbent pale pubescence. Labrum large, tridentate, the outer teeth not much larger then median tooth. Pronotum elongate, the punctures slightly smaller than those of head and round; pronotum with fine pale pubescence comparable to that of head. Elytra elongate, covered in numerous large foveate punctures not aligned serially; disc of elytra devoid of granulation, granules only evident near anterior and posterior borders; elytra clothed in fine pale recumbent pubescence comparable to that of head and pronotum.

Male: 8th sternite with scarcely discernible broad shallow emargination. Aedoeagus see Fig. 12.

Differential diagnosis

This species is similar to *S. baliemensis* n. sp. in its obsolescent elytral granules, but is a larger species with a different aedoeagus.

Stilicoderus aerosoides **n. sp.**

Holotype (♂): Irian Jaya, Jayawijaya, Wamena, Pronggoli, 2000–2400 m, 17.–19.IX.1991, leg. A. Riedel (SMNS).

Paratypes: 1♂, 6♀♀, same data as holotype (5 exx. SMNS, 2 exx. CRO).

Description

Body length 5.5–6.0 mm. Proportions of holotype: length of head: 85; breadth of head: 88; diameter of eye: 29; length of antenna: 160; length of pronotum: 86; breadth of pronotum: 68; length of elytron: 100; breadth of elytra: 90; metatibia: 83; metatarsus: 50.

Head and pronotum dark brown to fuscous, elytra light brown, abdomen dark brown with tergites 7–9 pale brown, palpi and legs reddish brown, legs pale brown or fuscous. Head slightly transverse, with marked postero-lateral angles, the punctures slightly elongate and with conspicuous pale recumbent pubescence. Pronotum elongate, the puncturation granulose on entire surface, also clothed in pale recumbent pubescence. Elytra elongate, with numerous large foveate punctures in parts more or less aligned in parallel rows, the interstices shiny, entirely devoid of granules, and with sparser and less evident pale pubescence than on rest of fore-body.

Male: aedoeagus see Fig. 13.

Differential diagnosis

I have named this species after *S. aerosus* Last in reference to the evident pubescence (although this is shorter than in *aerosus*), and the granulose pronotum, but the new species lacks the sub-aeneous lustre of *S. aerosus*.

Stilicoderus sp. X.

2♀♀, Irian Jaya, Jayawijaya, Wamena, Jiwika, 2300 m, 29.IX.1992, leg. A. Riedel; 2♀♀, Irian Jaya, Baliem Tal, Jiwika-Wandaku, 1900–2200 m, 5.–6.IX.1990, leg. A. Riedel (3 exx. SMNS, 1 ex. CRO).

Description

Body length 6.1–6.3 mm. Proportions: length of head: 88; breadth of head: 90; diameter of eye: 31; length of antenna: 164; length of pronotum: 82; breadth of pronotum: 74; length of elytron: 118; breadth of elytra: 104; metatibia: 85; metatarsus: 51.

Head and pronotum black, elytra brown, abdomen brown, palpi, antennae and legs reddish brown, the meso- and metafemora obscured in some individuals. Head slightly transverse, rather depressed, the punctures slightly elongate, closer anteriorly where the interstices tend to form longitudinal rugae. Head covered in pale recumbent pubescence. Labrum tridentate, the outer teeth slightly longer and stouter than lateral teeth. Pronotum elongate.

Covered in dense granulose puncturation and pale recumbent pubescence. Elytra elongate, the large foveate punctures not serially aligned; elytra totally devoid of granules, but with long, pale recumbent pubescence.

Male: unknown.

Female: posterior margin of 8th sternite (Fig. 23) broadly produced in the middle.

Remark

This is the largest known member of the aerosus group and as such should be readily separated from other species using the key above.

Stilicoderus papuanus **n. sp.**

Holotype (♂): Irian Jaya, Anggi, Tetaho, Kosmena, 1400–1750 m, 26.–28.III.1993, leg. A. Riedel (SMNS).

Paratypes: 23 exx., same data as holotype (18 exx. SMNS, 5 exx. CRO).

Description

Body length 4.5 mm. Proportions of holotype: length of head: 70; breadth of head: 68; diameter of eye: 25; length of antenna: 136; length of pronotum: 68; breadth of pronotum: 60; length of elytron: 80; breadth of elytra: 68; metatibia: 70; metatarsus: 42.

Head and pronotum dark brown to fuscous, elytra and abdomen brown, palpi, antennae and legs reddish brown. Head sub-quadrate, the punctures fine and close, becoming elongate anteriorly; head with short, fine pale recumbent pubescence. Pronotum elongate, covered in granulose punctures and fine, pale recumbent pubescence longer than that of head. Elytra elongate, the foveate punctures not aligned serially except more or less in some parts in some individuals. Fine granulose puncturation evident near humeral angles and more broadly near posterior margins.

Male: 8th sternite unmodified. Aedoeagus see Fig. 14.

Female: 7th sternite broadly produced apically (Fig. 22).

Differential diagnosis

In its brown colour *S. papuanus* n. sp. resembles *S. aerosoides* n. sp., *S. aerosus* Last and *S. baliemensis* n. sp. but differs from all three in its proportionately larger head (broader than elytra) and in the extent of granulose areas on the elytra and the aedoeagus.

japonicus group

Stilicoderus continentalis **n. sp.**

Cited as *Stilicoderus continentalis* in Assing 2013a: 59.

Holotype (♂): China, Zhejiang Prov., Lin'an County, W. Tianmu shan N. R., V.1996, flight interception trap, leg. J. Cooter (CRO).

Paratypes: 1♀, China, Zhejiang Prov., Anji County, Long Wang Shan N. R., 14.V.1996, flight interception trap, leg. J. Cooter (CRO); 3♀♀, China, Fujian Prov., Wuyi Shan, ca. 800 m, N27°75′ E117°68′, ca. 2 km NE Tongmu vill., flight interception trap, 4.–7.VI.2001, leg. J. Cooter & P. Hlaváč (CRO).

Further material: 1 ex., China, Fujian Prov., Wuyi Shan, 1150 m, N27°70′ E117°64′, Qiliqiao–Guadun rd, 1.VI.2001, mixed forest litter, leg. J. Cooter & P. Hlaváč (CRO); 1♂, China, Sichuan Prov., Qingcheng Shan, NW Chengdu, 650–700 m, 30.53.57N 103.32.23E, 3.–4.VI.1997, leg. M. Schülke, det. G. de Rougemont as *Stilicoderus formosanus continentalis* (CVA).

Description

Body length ca. 6.3 mm. Proportions of holotype: length of head: 91; breadth of head: 88; diameter of eye: 16; length of antenna: 153; length of pronotum: 86; breadth of pronotum: 76; length and breadth of elytra: 100; metatibia: 94; metatarsus: 58.

Fore-body black, shiny, abdomen pitchy-black, labrum, mouthparts, antennae and legs reddish brown.

Male: aedoeagus see Fig. 15; the parameroid lobes are broadly rounded apically, not acute as in *S. formosanus* (cf. aedoeagus of *S. formosanus*, Rougemont 1996: 731, fig. 18); the apical process of the ventral blade is slightly differently shaped, broader and devoid of a small ventral tooth. Abdominal sternite VIII deeply emarginate, as in *S. formosanus*.

Differential diagnosis

S. continentalis n. sp. is similar in every respect to the *S. formosanus* except in its conspicuous pubescence and in the aedoeagus. The reddish brown pubescence of the head is fairly long (ca. 10) and erect; that of the pronotum and elytra is short (ca. 4) and erect. In *S. formosanus* the pubescence on all parts of the fore-body is very short (ca. 2) and inconspicuous. The apex of the ventral blade of the aedoeagus (Fig. 15) of the new species is characteristic, and like the difference in pubescence, is constant over the vast range encompassed by the distances between Fujian, Zhejiang and western Sichuan.

Remark

I had assumed that this new subspecies is the representative form of *S. formosanus* Rougemont 1996 (described from Taiwan) in mainland China, but Assing (2013a) records *S. formosanus* from Fujian.

feae-discalis-signatus group

Stilicoderus sarahae **n. sp.**

Holotype (♂): China, Yunnan, Lijiang, Qiaotou, 14.IV.2003, in moss and litter by stream, leg. G. de Rougemont (CRO).

Paratypes: 4♂♂, 4♀♀, same data as holotype (CRO).

Description

Body length 7.0–7.5 mm. Proportions of holotype: length of head: 103; breadth of head: 98; diameter of eye: 28; length of antenna: 165; length of pronotum: 98; breadth of pronotum: 87; length of elytron: 108; breadth of elytra: 114; metatibia: 100; metatarsus: 70.

Body entirely black; labrum dark brown; antennae, tibiae and tarsi brown, femora pitchy black. Median tooth of labrum minute, the inner lateral pair large and blunt, the outer lateral pair small, blunt. Head sub-orbicular, without posterior angles, the puncturation fairly coarse and dense, the interstices everywhere narrower than diameter of punctures except in a couple of places at centre of vertex, the punctures slightly elongate. Pronotum densely covered in discrete large flattened setiferous granules, leaving an entire, broad (10–15) smooth impunctate mid-longitudinal band. Elytra with large, deep simple foveate punctures in parts aligned in longitudinal rows, the interstices with sparse, minute granules on whole surface, becoming denser in impunctate apical area. Abdomen densely, finely, homogeneously punctate as in related species.

Male: sternite VIII see Fig. 24, with a large flat median depression, the surface of this depression dull, densely microsculptate, the posterior margin with a large triangular emargination not abruptly narrowed into a parallel-sided fundus as in *S. birmanus*. Aedoeagus see Fig. 16, quite unlike that of *S. birmanus*, the ventral blade relatively small, in ventral view lanceolate and concave on ventral surface, its apex in lateral view recurved ventrally.

Female: tergite X unmodified.

Differential diagnosis

This new species closely resembles *S. birmanus* Scheerpeltz 1965, to which it runs in the key to species in Rougemont 1986a: 149, couplet 59 (60), but single females would not be identifiable without comparison material. The most salient difference between the species is the longer antennae of *S. sarahae* of which segments 3–11 are all conspicuously elongate; the head of the new species is slightly more elongate and less convex; the pronotum is likewise slightly more elongate, and the granulose puncturation a little sparser and not tending to coalesce into elongate/vermiculate rugae as in *S. birmanus*; the legs of *S. sarahae*, especially the tibia, are slightly longer. The aedoeagi and male 8th sternites, as can be seen in my 1986a article and the present one, are completely different.

Remark

I have recorded *S. birmanus* from Yunnan (Rougemont 1996) based on a single female I took in Kunming, but the occurrence of *S. birmanus* in China needs confirmation by the presence of males there. In any case the two species are likely to be sympatric, since the type localities are very close together on either side of the Yunnan-Burma border.

Stilicoderus feae Fauvel

Stilicoderus feae Fauvel 1895: 224.
Stiliderus feae: Rougemont 1986a: 117.
Stilicoderus feae: Rougemont 1996: 718.

5 exx., Vietnam, Lao Cai, ca. 40 km SE Sapa, 1800 m, 15.–16.II.2005, leg. G. de Rougemont (CRO).

Remark

Widely distributed from Nepal to Yunnan.

Stilicoderus discalis Fauvel

Stilicoderus discalis Fauvel 1895: 225.
Stiliderus discalis: Rougemont 1986a: 163.
Stilicoderus discalis: Rougemont 1996: 715.

1 ♂, China, Guangxi Pr., Nong Gang N. R. Long Rui, 25.V.1998, J. Fellowes; 1 ♀, China, Guangxi, Xidamingshan, 16.X.1998, J. R. Fellowes (both CRO).

Remark

Hitherto recorded from Burma, Thailand and China. A series of 30 exx. from Thailand, Phetchaburi, Kaeng Krachan National Park in MHNG was wrongly recorded as the closely related *S. strigosus* Rougemont in Rougemont 1996: 719; that series, bearing correct determination labels, also belongs to *S. discalis* Fauvel.

Stilicoderus bacchusi (Rougemont)

Stiliderus bacchusi Rougemont 1986a: 165.
Stilicoderus bacchusi: Rougemont 1996: 715.
Stilicoderus bacchusi: Assing 2014: 485.

1 ♂, Malaysia, Sabah, Lahad Datu, Ulu Segama For. Res., Danum Valley Forest Centre, 04°57.9′N 117°48.1′E, 200 m alt., xi.2005, 1° For. FIT, coll. Mann, Slade & Villanueva (OUMNH-2006-051); 3 exx., E. Java, 20.IX.1995, 50 km S Surabaya, 800 m, Tretes Kekek Bodo WF, leg. Schillhammer (2 exx. NHMW, 1 ex. CRO).

Remark

This species, which I had assumed was the endemic representative taxon of the discalis sub-group (which includes *S. discalis* Rougemont and *S. strigosus* Rougemont) in Borneo, is new to Java, and Assing (2014) has also recorded *S. bacchusi* from West Malaysia.

Stilicoderus fenestratus Fauvel

Stilicoderus fenestratus Fauvel 1895: 225.
Stilicoderus pendleburyi Cameron 1950: 12, **n. syn.**
Stiliderus fenestratus: Rougemont 1986a: 169.
Stiliderus pendleburyi: Rougemont 1986a: 173.
Stilicoderus fenestratus: Rougemont 1996: 719.

2 ♀♀, Malaysia, Cameron Highlands, 22.–30.III.1984, leg. G. DE ROUGEMONT; 4 ♂♂, same data, but X.1990; 1 ex., Vietnam, Lao Cai, ca. 40 km SE Sapa, 1800 m, 15.–16.II.2005, leg. G. DE ROUGEMONT (all CRO).

Remark

S. pendleburyi was described from a single female specimen. The males taken in 1990 from the type locality show that notwithstanding the slight external differences described in ROUGEMONT 1986a, the Malaysian exx. are merely a local form of *S. fenestratus* with immaculate elytra. *S. fenestratus* is therefore recorded for the first time from Malaysia and Vietnam. The ex. from Vietnam is the typical, maculate form.

v a r i o l o s u s group

Stilicoderus trapezeiceps (Rougemont)

Stiliderus trapezeiceps ROUGEMONT 1986a: 161.
Stilicoderus trapezeiceps: ROUGEMONT 1996: 715.

1 ♂, Burma, Shan Prov., Nambsan, 1600 m, litter, 18.II. [19]98, leg. S. KURBATOV (CRO).

Remark

Previously known from Thailand and Yunnan; new to Burma.

3.2 *Stiliderus* Motschulsky

b r e n d e l l i group

Stiliderus tengah **n. sp.**

H o l o t y p e (♂): Indonesia, C. Sulawesi, Palu Palolo, Lindu N. P., 25.–27.VIII.1990, leg. A. RIEDEL (SMNS).
P a r a t y p e : 1 ♀, same data as holotype (CRO).

Derivatio nominis

The Malay adjective tengah means "central"; it is used here in reference to the type locality in Central Sulawesi, whereas related species are either from North or South Sulawesi.

Description

Body length ca. 6 mm. Proportions of holotype: length of head: 85; breadth of head: 83; diameter of eye: 27; length of antenna: 200; length of pronotum: 85; breadth of pronotum: 69; length of elytron: 85; breadth of elytra: 98; metatibia: 92; metatarsus: 51.

Fore-body black; abdomen pitchy brown; antennae reddish brown, antennomeres I–VII decreasingly infuscate distally; femora fuscous, tibia reddish brown, metatibia and tarsi infuscate.

Male: apical margin of abdominal sternite VII broadly and feebly excised; entire apical margin of sternite VIII deeply, arcuately excised, the apico-lateral angles furnished with a brush of dark setae as in *S. kakimerah* Rougemont (see ROUGEMONT 1996: fig. 15) and *S. kakihitam* Rougemont. Aedoeagus see Fig. 17.

Female: apical margin of tergite X with a small, broad triangular median emargination.

Differential diagnosis

This, like the following four new species, belongs to the Celebesian endemic brendelli group; in size, facies and puncturation it is almost indistinguishable from *S. kakihitam* Rougemont 1996 described from N Sulawesi. It only differs from *S. kakihitam* in the somewhat more depressed elytra, darker antennae, slightly smaller emargination of female tergite X, and in the shape of the ventral blade of the aedoeagus (see ROUGEMONT 1996: fig. 29). It appears to be the sister species of *S. kakihitam* in central Sulawesi.

Stiliderus germanus **n. sp.**

H o l o t y p e (♂): Indonesia, C. Sulawesi, Palu Palolo, Lindu N. P., 25.–27.VIII.1990, leg. A. RIEDEL (SMNS).
P a r a t y p e s : 3 ♂♂, 4 ♀♀, same data as holotype (5 exx. SMNS, 2 exx. CRO).

Description

Body length 6.0–6.5 mm. Proportions of holotype: length of head: 98; breadth of head: 100; diameter of eye: 30; length of antenna: 198; length of pronotum: 97; breadth of pronotum: 86; length of elytron: 96; breadth of elytra: 113; metatibia: 104; metatarsus: 51.

Black, labrum pitchy with margins rufescent; palpi rufo-testaceous; antennae dark brown, antennomere I infuscate; legs pitchy black, pro- and mesotibia and all tarsi dark reddish brown.

Male: apical margin of abdominal sternite VII broadly and very shallowly concave; sternite VIII see Fig. 25, with a moderate emargination, the surface anterior to the emargination broadly, concavely depressed; apical margin of tergite X with a small median emargination. Aedoeagus see Fig. 18.

Female: abdominal tergite X very deeply emarginate, as in *S. yangbesar*, forming two long, pointed apico-lateral lobes.

Differential diagnosis

This species only differs externally from *S. yangbesar* Rougemont 1996 described from north Sulawesi in its slightly lesser size (*S. yangbesar* ca. 7 mm), slightly denser puncturation of the head, and the aedoeagus. It appears to be the sister species of the northern Celebesian species *S. yangbesar* in central Sulawesi.

Stiliderus rugulosicollis **n. sp.**

Holotype (♂): Indonesia, S. Sulawesi, Tanah Toraja, Pulu Pulu, 1700 m, 13.–16.VIII.1990, leg. A. Riedel (SMNS).
Paratype: 1 ♀, same data as holotype (CRO).

Description

Body length 5.8 mm. Proportions of paratype: length of head: 87; breadth of head: 80; diameter of eye: 25; length of antenna: 195; length of pronotum: 90; breadth of pronotum: 69; length of elytron: 92; breadth of elytra: 100; metatibia: 100; metatarsus: 55.

Black, mandibles, margins of labrum and palpi rufo-testaceous; tibia and tarsi dark reddish brown, the latter more or less infuscate; holotype (teneral) with elytra and abdomen brown, antennae and legs entirely testaceous. Fore-body see Fig. 31.

Male: abdominal sternite VII unmodified; sternite VIII with a broad, very shallow emargination. Aedoeagus see Fig. 19 (the specimens are somewhat teneral; the very weakly sclerotised aedoeagus is collapsed and could not be illustrated in ventral view).

Female: [abdominal segment X missing].

Differential diagnosis

S. rugulosicollis n. sp. runs to *S. conicollis* from Tanah Toraja in my key to the Celebesian species (Rougemont 1996: 726). It differs from *S. conicollis* in its coarser cephalic puncturation, coarser and more regular sculpture of the pronotum, which consists of thick, scarcely interrupted longitudinal rugae leaving the mid-longitudinal band isolated from the first longitudinal rugosity on either side by a deep groove; it differs also in the somewhat smaller and more sparsely punctured elytra, and by an almost total absence of pubescence on the fore-body (short and erect on elytra, forwardly recumbent on pronotum, and particularly conspicuous on head in *S. conicollis*), and in the conformation of the aedoeagus.

Stiliderus brendellianus **n. sp.**

Holotype (♂): Indonesia, C. Sulawesi, Palu Palolo, Lindu N. P., 25.–27.VIII.1990, leg. A. Riedel (SMNS).
Paratype: 1 ♀, same data as holotype (CRO).

Derivatio nominis

This new species is dedicated to my friend Martin Brendell, who was the first to find this genus in Sulawesi, and helped me in many ways at the Natural History Museum in London for thirty-three years.

Description

Body length 4.6 mm. Proportions of holotype: length of head: 70; breadth of head: 71; diameter of eye: 24; length of antenna: 152; length of pronotum: 73; breadth of pronotum: 60; length of elytron: 73; breadth of elytra: 82; metatibia: 78; metatarsus: 41.

Black, abdomen pitchy brown; labrum and antennae rufo-testaceous; palpi and legs paler, testaceous.

Male: apical margin of sternite VII very shallowly, arcuately excised; emargination of sternite VIII broad and shallow. Aedoeagus see Fig. 20.

Female: tergite X see Fig. 26, broadly emarginate, with a single long seta on each apico-lateral lobe and an apical row of shorter setae.

Differential diagnosis

This new species runs to *S. brendelli* from eastern Central Sulawesi in my key to the Celebesian species (1996: 725). It differs from *S. brendelli* in its very slightly less transverse head, in the slightly finer and denser cephalic puncturation, in its uniformly testaceous legs (meso- and metafemora more or less strongly infuscate in *S. brendelli*), in the near total absence of visible pubescence on pronotum and elytra (scattered long setae interspersed with numerous finer and shorter hairs in *S. brendelli*), and in the male sex characters: shallower emargination of sternite VIII and the shape of the ventral blade of the aedoeagus, the apex of which is somewhat spatulate in ventral view.

Stiliderus sp. Z

1 ♂, 5 ♀♀, Indonesia, C. Sulawesi, Palu Palolo, Lindu N. P., 25.–27.VIII.1990, leg. A. Riedel (4 exx. SMNS, 2 exx. CRO); 1 ♀, S. Sulawesi, Pc. Palopo, 620–780 m, 14.IX.1997, leg. A. Riedel (NHMW).

Description

Body length 5.0–5.5 mm. Proportions: length of head: 79; breadth of head: 80; diameter of eye: 26; length of antenna: 170; length of pronotum: 80; breadth of pronotum: 68; length of elytron: 83; breadth of elytra: 94; metatibia: 85; metatarsus: 47.

Black, abdomen pitchy black; labrum dark brown, the margins paler; palpi, antennae and legs testaceous. Fore-body see Fig. 29.

Male: aedoeagus lost; 8th abdominal sternite with a broad triangular emargination; abdominal tergite X see Fig. 27, in both sexes with a small margination, the apico-lateral lobes fringed with numerous sub-equal setae, without a single longer seta.

Remark

This species runs to *S. brendelli* in my 1997 key, by virtue of the combination of its glossy head and elytra devoid of microsculpture, and in the shape of the head, with pronounced apico-lateral angles. It also resembles that spe-

cies and *S. brendellianus* n. sp. in the fine sculpture of the pronotum, but is a larger insect than either. In the shape of the quadrate, not markedly transverse head and uniformly testaceous legs it most closely resembles *S. brendellianus*, from which it differs in proportions and in the conformation of the female abdominal tergite X.

Stiliderus agostii **n. sp.**

Holotype (♂): Indonesia, Sulawesi Sel. W. of Mamasa, 1600 m, 9.IV.1991, D. Agosti, F91724 (MHNG).
Paratype: 1 ♂, same data as holotype (CRO).

Description

Body length ca. 5.2 mm. Proportions of holotype: length of head: 71; breadth of head: 74; diameter of eye: 23; length of antennomeres: I: 28; II: 9; III: 15; IV: 13; V: 13; VI: 13; VII: 12; VIII: 10; IX: 10; X: 10; XI: 15; length of pronotum: 70; breadth of pronotum: 61; length of elytron: 70; breadth of elytra: 80; metatibia: 81; metatarsomeres: I: 11; II: 8; III: 5; IV: 8; V: 15.

Head and pronotum black, elytra brown, abdomen fuscous, labrum brown, mouthparts and antennae and legs rufo-testaceous, the femora somewhat infuscate. Forebody see Fig. 30. Head transverse, sub-quadrate, the punctuation close, the interstices on average smaller than diameter of punctures on vertex, the punctures becoming elongate near base, the interstices very densely micropunctate, the surface therefore dull. Pronotum elongate, widest at posterior two-fifths, densely and finely granulose with a narrow, entire, raised mid-longitudinal line, the granules serially arranged in a chevron pattern extending from mid-longitudinal line towards apico-lateral angles in posterior two-thirds. Elytra transverse, subquadrate, depressed, with large punctures more or less serially aligned especially laterally, the interstices very densely microsculptate, the surface dull.

Male: abdominal sternite VIII see Fig. 28, with a broad arcuate emargination. Aedoeagus see Fig. 21, the apex of the ventral blade tapering into a small dorsally recurved hook.

Female: unknown.

Differential diagnosis

By virtue of its transverse, sub-quadrate and densely microsculptate head, impunctate mid-longitudinal line of the pronotum and opaque elytra this new species resembles *S. schoedli* Rougemont 1996, to which it runs in my 1996 key to the Celebesian species. The new species differs from *S. schoedli* in its slightly smaller size, narrower head with less prominent apico-lateral angles and much more densely microsculptate and therefore duller surface, in the more broadly and deeply emarginate male sternite VIII, and in the aedoeagus. *Stiliderus agostii* n. sp. differs from the only other two known microsculptate species of the brendelli group, *S. opacus* Rougemont 1996 and *S. opacipennis* Rougemont 1996, in its subquadrate, not orbicular head, as described in dichotomy 7 of the 1996 key.

c i c a t r i c o s u s group

Stiliderus cardamomensis Rougemont

Stiliderus cardamomensis Rougemont 1996: 732.

1 ♂, India, Orissa, Gajapati, Taptapani, 16.X.2006, leg. G. de Rougemont (CRO).

Remark

This new record shows that this species is not restricted to the mountains of south India as I had supposed but also occurs in this remaining patch of rainforest in the eastern Ghats of Orissa (and Assing 2013a has recorded it from the western Ghats, Goa!). Another staphylinid taken that day in the same locality, *Mitomorphus nilgiricus* Bordoni, was also previously thought to be endemic to the mountains of south India (see chapter on biogeography, below).

Stiliderus crassus (Kraatz)

Psilotrachelus crassus Kraatz 1859: 124.
Stiliderus crassus: Rougemont 1986d: 44.
Stiliderus crassus: Rougemont 1996: 732.
Stiliderus crassus: Rougemont 2001: 49.
Stiliderus crassus: Assing 2014: 493.

1 ♀, Burma, env. Maymyo, 700–800 m, 4.–5.III.96, leg. S. Kurbatov; 1 ♀, Burma, Chin prov., env. Saw, 900–1500 m, 7.–8.X.1996, leg. S. Kurbatov (both MHNG). 1 ♂, Comores, Mayotte, Bouyouni (res. for. Bandramaji) IX.[19]98, leg. J. Sudre; 9 exx., Thailand, Chiang Dao, 26.X.2010, leg. G. de Rougemont; 1 ex., Thailand, Doi Ankhang, 24.X.2010, leg. G. de Rougemont; 3 exx., Thailand, Kho Yao Noi (island), 31.X.2010, leg. G. de Rougemont (all CRO).

Remark

New to Burma and the Comoro Islands. *S. crassus* is the most widely distributed member of the genus, now known from continental Asia (Assam, Burma, Thailand, Malay peninsula, Vietnam, China) and from the islands of Ceylon, Penang (Rougemont leg., 1990) and Lombok. It is erroneously cited from Celebes (Rougemont 1996: 716, and consequently in Assing 2014: 493); these references should read Ceylon.

This is the first record of a member of the genus outside the oriental region; this is not very surprising however, as a number of other oriental Staphylinidae (e. g. *Astenus leptocerus* (Eppelsheim), *A. maculipennis* (Kraatz), *Cephisella brachycera* (Kraatz), *C. rufa* (Kraatz), *Medon planus*

(Kraatz), *Lithocharis sororcula* (Kraatz), *Phacophallus* spp., *Philonthus* spp.) occur in other islands of the western Indian Ocean (e. g. Mascarene islands, Lecoq 1986). The fact that these are all species that are common and widespread on the Indian subcontinent and Ceylon, rather than endemic representatives of oriental genera or species groups in a different zoogeographic region, suggests that they were introduced by man, probably in vegetable matter imported from south Asia.

Stiliderus brevipennis (Bernhauer)

Psilotrachelus brevipennis Bernhauer 1928: 34.
Stiliderus brevipennis: Rougemont 1986d: 40.

1 ♂, Malaysia, Pahang, Cameron HL, Tanah Rata, 1200–1500 m, "3", 19.II.2005, leg. P. Čechovsky (CRO); 1 ♂, W. Malaysia, Johore, Insel Tioman, 4.I.1999, leg. H. Schmid (CRO); 3 exx., Malaysia-W, Perak, 25 km NE Ipoh, 1200 m, Banjaran Titi Wangsa mnts., Korbu Mt., 1.–15.IV.2000, leg. P. Čechovsky (CRO); 1 ex., Malaysia, Sabah, 10.–16.XI.2012, 4.70N 117.52E, 250 m Alt, Coll. C. L. Gray, SAFE project area, Riparian forest strip in oil palm (OUMNH 2013-056).

Remark

Hitherto known from Borneo, Sumatra and the West Malaysian mainland; new to Tioman island.

Stiliderus cicatricosus Motschulsky

Stiliderus cicatrisosus: Rougemont 1986d: 43.
Stiliderus cicatricosus: Rougemont 1996: 716.
Stiliderus cicatricosus: Assing 2014: 493.

3 exx., Sumatra, Aceh #25a, Mt. Leuser NP, 300–500 m, Ketambe, 23.–30.XI.1989, Löbl, Agosti, Burckhardt (2 exx. MHNG, 1 ex. CRO).

Remark

Previously recorded from localities in Burma, Thailand, Yunnan and peninsular Malaysia (Rougemont 1996: 716; Assing 2014); this new record shows that it also occurs across the straits of Malacca.

Stiliderus aviformis Assing

Stiliderus aviformis Assing 2014: 493.

2 ♂♂, 1 ♀, Thailand, Doi Ankhang, 24.X.2010, leg. G. de Rougemont (CRO).

Remark

This is the second record for this species which was also described from a locality in NE Thailand.

Stiliderus sp. Y

1 ♀, Indonesia, Lombok, Sapit–Sembalun Bumbung, 900–1500 m, 14.–16.II.1994, leg. Bolm (SMNS).

Description

Body length 6 mm. Proportions: length of head: 90; breadth of head: 95; diameter of eye: 26; length of antenna: 175; length of pronotum: 88; breadth of pronotum: 80; length of elytron: 103; breadth of elytra: 117; metatibia: 98; metatarsus: 57.

Black, abdomen and legs pitchy brown, the tibia and tarsi somewhat paler; labrum and antennae brown, first antennomere infuscate; palpi dark testaceous. Pubescence of fore-body fairly sparse, short, erect. A squat, robust species with relatively short appendages. Head only slightly transverse, the puncturation moderately fine and close, the interstices on disc about as wide as diameter of punctures. Pronotum broadest at anterior angles which are situated at a little more than one-fourth from centre of anterior margin; the sculpture of pronotum is unique in the genus, consisting of fine transverse parallel rugae disposed in a slight arc and extending right across disc from lateral margins; a trace of an impunctate mid-longitudinal band exists, but only briefly at either extremity; elsewhere the raised mid-longitudinal axis is overlaid by the transverse rugae. Elytra ample, only slightly transverse, the surface between serially arranged large foveate punctures densely covered with setiferous granules.

Remark

This species belongs by definition to the heterogeneous, pan-oriental cicatricosus group. Its closest affiliation is not known. In my 1986d key to the species of *Stiliderus* this species runs to *S. simoni* Rougemont, being the only other *Stiliderus* with the combination of granulose elytra and absence of an entire impunctate mid-longitudinal band on the pronotum, but the two species are quite unlike each other and are not closely related. *S. simoni* is a much smaller insect with the pronotum entirely covered by isolated setiferous granules. Sp. Y is easily recognised by its type of pronotal sculpture alone.

4 Notes on biogeography

The wealth of material of these two genera studied shows a geographical pattern of speciation that is broadly reflected by that of other groups (e. g. Steninae, Leptochirini) but is now seen more clearly and in greater detail than in many other genera of Staphylinidae. Mainland Asia (plus the Sunda Islands, which lie on its continental shelf) has a known fauna of about 70, mostly widely distributed species belonging to seven phyletic species groups (japonicus group, granulifrons group, feae-disca-

lis-signatus group, minor group, variolosus group, magniceps-duplicatus group, cicatricosus group).

Peripheral areas (Japan, Taiwan, Ceylon, South India) have small numbers of species, some of them endemic, belonging to these same species groups, as follows:

– Japan: japonicus group: 1 species; feae-discalis-signatus group: 1 species; magniceps-duplicatus group: 1 species (endemic).

– Taiwan: japonicus group: 2 species (1 endemic); feae-discalis-signatus group: 3 species (2 endemic); minor group: 1 species.

– Sri Lanka: cicatricosus group: 2 species (1 endemic).

– South India: variolosus group: 1 species (endemic); cicatricosus group: 2 species (endemic). South India moreover has an endemic species group (umbratus group) containing 3 taxa.

See also data for *Stilicoderus cardamomensis*, above.

Puthz has recently (2011) described new species of Steninae from the western Ghats that have close affinities with south Indian endemics. These new data suggest that this relict fauna may not be confined to highland areas of India south of latitude 12°, but be more widely distributed in the very few isolated patches of old forest that survive in the Deccan, in particular in the eastern and western Ghats (ranges of hills that drop abruptly from the Deccan plateau to the coasts).

The fauna of the Sunda Islands belongs to four of these groups, the feae-discalis-signatus group, variolosus group, magniceps-duplicatus group and cicatricosus group, and includes 20 species, 13 of which are only known from one or more of the islands. Two species are known from the island of Lombok, both different from those known from Bali and Java; one of these (*Stiliderus* sp. Y) is tentatively assigned to the cicatricosus group but is aberrant and only known from Lombok, and may prove, when males are found, to represent a phyletic group of its own.

The remainder of the range occupied by *Stiliderus* and *Stilicoderus* lies in four distinct zoogeographical sub-regions each of which is well known for high levels of endemicity: the Philippines, Celebes, the Papuan region (island of New Guinea and outlying islands, including the Moluccas, with two elements in the Cape York peninsula, Australia), and Australia. Each of these regions, except Australia, is proportionately richer in species than mainland Asia and the Sunda Islands. All species in these regions are endemic to the particular region, but the composition of phyletic groups is quite different in each case. For instance all but one of the 16 known Philippine species belong to continental groups. In Sulawesi this pattern is reversed, with only one member of the continental cicatricosus group and 15 species belonging to the Celebesian endemic brendelli group. No continental phyletic groups are represented in the Papuan and Australian sub-regions, where the endemic groups are diverse and may not even be monophyletic (Rougemont 1996: 714). They are distributed as follows:

– Philippines: praecellens group (endemic): 1 species; feae group: 1 species; cicatricosus group: 14 species (all endemic).

– Sulawesi: brendelli group (endemic): 14 species; cicatricosus group: 1 species (endemic).

– Papuan region and Moluccas: funebris group (endemic): 3 species; hieroglyphicus group (endemic): 25 species (+ ca. 15 others seen); aerosus group (endemic): 9 species (+ 1 other seen).

– Australia: aberrans group (endemic): 10 species. In addition, Australia has 1 endemic species each of the Papuan hieroglyphicus and aerosus groups in the Cape York peninsula).

The fauna of New Guinea and outlying islands appears to be very rich. Moreover this vast area has yet to be explored by staphylinid specialists working in the field.

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* The date of publication of this article is given as 1928 in SCHEERPELTZ (1934), in PUTHZ (1980) and in two of my previous papers on *Stiliderus* (1986d, 1995), but as 1929 in several sources of the internet (e. g. http://www.zobodat.at/D/runD/D/cacheD/literatur_liste.php?wc=a.adrnr=3945&ord=order%20by%20s.name, http://www.abebooks.com/Verhandlungen-Zoologisch-Botanischen-Gesellschaft-Wien-Band-1928/774262233/bd, http://www.europeana.eu/portal/record/08702/E72296A4E6868F3C71ECA2646C268D94BD41AAEA.html). I have examined the original editions of Volumes 77 and 78 of "Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien" (bound together) in the Radcliffe Science Library, Oxford University. The title page of volume 78 states "Jahrgang 1928" near the top of the page, and "Wien, 1929" nearer the bottom of the page. The title page of BERNHAUER's article (page 29 of the volume) gives the information "Eingelaufen am [= Received on] 12.IV.1928". The indication "Vienna 1929" appeared conclusive, but then on the last page of the article (page 44 of the volume) there are two library stamps, which also appear randomly on pages throughout the volume: 1. [round seal] "BODLEIAN LIBRARY 28 Jul. 1928" indicating the date on which the library acquired the volume, and 2. "RADCLIFFE" (the science books in the Bodleian were transferred to the Radcliffe Library).

Lastly the clinching argument for retaining 1928 as the publication date was provided by HANS-PETER TSCHORSNIG who found another reference, also online (http://www.landesmuseum.at/pdf_frei_baende/28070.pdf), showing the title page of the first issue of volume 78 which states "Ausgegeben am [= Issued on] 15. Juni 1928" (I failed to see this in the library copy I examined).

BERNHAUER's article is unusual in that the author does not give a formal description of any of the 14 new species he described from the Philippines, but only a dichotomous key. This might have been considered a reason for regarding these species as invalid, but in any case they have all been validated by full descriptions in ROUGEMONT 1986d. BERNHAUER's key is a good one: I had no difficulty in identifying all the Philippine species by using it. Each species was described in only a few short lines, but this proved more useful than the lengthy and detailed descriptions of some authors (the original description of *Stilicoderus malaisei* (Scheerpeltz 1965) extends to 1322 words). So 'BERNHAUER, 1928' they are, and I am sure none of us would want to raise an unnecessary doubt about the authorship of these species.

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Three new species of *Medome* Cameron (Coleoptera: Staphylinidae: Paederinae)

Guillaume de Rougemont

Abstract

Medome nigra **n. sp.** from Burma and Thailand, *M. schawalleri* **n. sp.** from Nepal and *M. siamensis* **n. sp.** from Thailand are described and compared with *M. bicolor* Cameron. All four species are illustrated by photographs.

Keywords: *Medome*, new species, India, Nepal, Burma, Thailand.

Zusammenfassung

Medome nigra **n. sp.** aus Burma und Thailand, *M. schawalleri* **n. sp.** aus Nepal and *M. siamensis* **n. sp.** aus Thailand werden beschrieben und mit *M. bicolor* Cameron verglichen. Alle vier Arten werden mit Fotografien dargestellt.

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1 Introduction

In 1931 Malcolm Cameron described the monobasic genus and species *Medome bicolor* from two localities in NW India, in what is now Uttarakhand State, where so many of the species of Staphylinidae he described in "Fauna of British India" were first found. No other occurrence of the genus or species has been recorded, but in 1981 I took a specimen of *M. bicolor* in the neighbouring State of Himachal Pradesh, and two new species in Thailand and Burma. More recently another new species was collected by Wolfgang Schawaller in Nepal.

Cameron gave a description of the generic characters, to which the following details may be added: both meso- and metatibia with a dense apical fringe, or ctenidium, of long pale setae; sculpture of pronotum entirely densely and deeply longitudinally strigose (with only one available species Cameron was uncertain whether this was a generic or specific character; the three new species described below show that it is indeed a generic character); both male sternites VII and VIII modified; sternite IX apically emarginate; aedoeagus without parameres, but with a prominent sessile ventral blade not freely articulated against the median lobe like a paramere, and devoid of setae.

The conformation of the male primary and secondary sexual characters differs greatly from one species to another. The male 8th sternites have a simple emargination of differing size and depth; the male 7th sternites are variously modified; the apex of the male 9th sternites also differs according to species; the ventral blade of the aedoeagus is very differently shaped in each species.

Several difficulties arose during the present study of *M. bicolor* Cameron. I dissected a male which I had collected in the Kullu Valley and compared the sexual characters with a single specimen of Cameron's series (from Mossy Falls, Mussoorie) and found them to be identical (aedoeagus see Figs. 1c, d); I therefore illustrated them as being the characters of *M. bicolor* in the first draft of this article. Fortunately Volker Assing, who reviewed the article, pointed out that the aedoeagus was quite different from one he had examined and photographed, so I asked to examine Cameron's entire series. Roger Booth, the curator, told me that Cameron's designated types had been misplaced in or removed from the main (general) collection of the BMNH, and sent me the 16 remaining specimens (all from several localities in Mussoorie district) which had been in Cameron's duplicates collection. Three of these specimens proved to be males identical to the one examined by Assing (Fig. 1f). For more details of data and results of the study see redescription of *M. bicolor* below.

Cameron compared *Medome* to *Domene* and *Scopaeus*. *Medome* does resemble *Domene*, especially in the structure of the aedoeagi, and is not closely related to *Scopaeus*.

Acknowledgements

I am grateful to Roger Booth, curator of Coleoptera at the BMNH, for the loan of the series of *M. bicolor* Cameron, to Wolfgang Schawaller (SMNS), for the opportunity of describing *Medome schawalleri* n. sp., and to Volker Assing (Hannover) for saving me from making a mistake with potentially annoying consequences in my interpretation of *M. bicolor*.

2 Material and methods

With the exception of *Medome schawalleri*, the type of which is deposited in SMNS, one specimen of *M. siamensis* in coll. Assing, and Cameron's series of *M. bicolor* in BMNH, the material studied in this paper was gathered in the field by the author and is housed in his collection in OUMNH. Two paratypes of *M. siamensis* n. sp. have also been deposited in SMNS.

Photographs were taken at OUMNH using a Leica DFC 490 digital camera linked to a Leica M165C microscope and Helicon Focus software. Figs. 2c and 2d were photographed imbedded in DMHF (dimethyl hydantoin formaldehyde); all other figures were photographed dry.

The term "fore-body" is used to include the head, pronotum and elytra, omitting the abdomen. Measurements other than those given in mm (total body length) given in the descriptions were made using a VMZ 1×4× binocular microscope with eyepiece micrometer at ×80 magnification, so the units are equal to 12.5 µ. The length of the head does not include the labrum; the breadth of head is measured at the widest point, just behind the posterior margins of the eyes and does not include the eyes.

Acronyms

BMNH	The Natural History Museum [formerly British Museum (Natural History)], London, United Kingdom
CRO	Collection Guillaume de Rougemont (currently housed in the OUMNH)
CVA	Collection Volker Assing, Hannover, Germany
OUMNH	University Museum of Natural History, Oxford, United Kingdom
SMNS	Staatliches Museum für Naturkunde, Stuttgart, Germany

3 Descriptions and redescription of *Medome* spp.

Medome bicolor Cameron

Medome bicolor Cameron 1931: 189. – Types: [India], "Mussoorie district: Arni Gad", "Chakrata district: Mohan".

"Syntype" series, 5 ♂♂, 11 ♀♀, Mussoorie [various localities: Mossy Falls (3 ♂♂, 3 ♀♀), Aglar River (1 ♂, 1 ♀), Arni Gad (1 ♂, 7 ♀♀)] (BMNH); 6 exx., Haldwani Dist., Kumaon, India, H. G. C. / G. C. Champion coll. BM 1927-409 (BMNH); 1 ex., Ret. unnamed by M. B. / W. Almora, Kumaon, India, H. G. C. / *Domene* n. sp. [handwritten] / G. C. Champion coll., BM 1927-409 (BMNH); 1 ♂, India, H. P., Katrain VI.1981, de Rougemont (CRO).

Redescription

Fore-body see Fig. 1. Body length 4.0–4.3 mm. Proportions (of a male syntype): length of head: 50; breadth of head: 48; length of antenna: 93; length of pronotum: 49; breadth of pronotum: 46; length of elytron: 60; breadth of elytra: 55; length of metatarsus: 34.

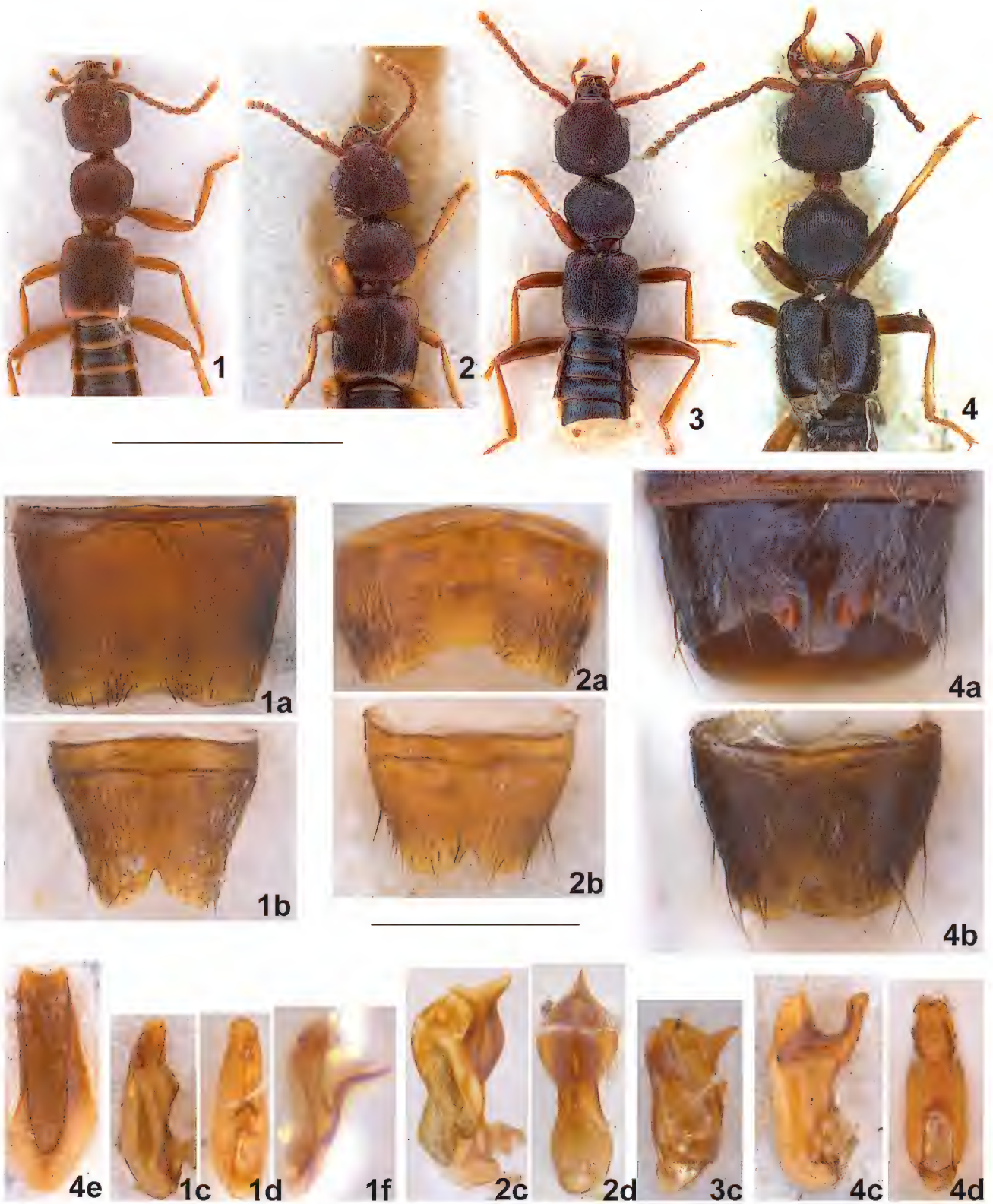
Head reddish brown; colouration of pronotum and elytra variable: pronotum either uniformly reddish brown like the head, or infuscate in parts or entirely pitchy (Fig. 1); elytra (rarely) entirely pitchy black, or pitchy with the anterior and posterior margins narrowly rufescent (bicolorous exx.), the reddish colour sometimes extending along suture, or pitchy with the anterior margin rufescent, the same colour as head and pronotum and the posterior margin more broadly yellowish testaceous (tricolorous exx.) (Fig. 1); abdomen pitchy black; labrum concolorous with head; antennae pale reddish brown; palpi and legs testaceous.

Surface of head dull, the sculpture sub-rugose, composed of small contiguous umbilicate punctures. Sculpture of pronotum as in the other species of the genus, strigose, i. e. the entire surface covered in contiguous deep longitudinal striae separated by sharp narrow keels, and without any trace of punctures. Surface of elytra slightly shiny posteriorly, the sculpture consisting of dense small simple punctures, sub-rugose in front but sparser posteriorly, with shiny interstices as, or almost as wide as diameter of punctures in posterior third; in addition to this ground sculpture each elytron bears three not very evident longitudinal series of larger shallower punctures. Abdomen slightly shiny, covered in very small punctures becoming finer and sparser on tergites VI and VII.

Male: abdominal sternite VII (Fig. 1a) with a small, shallow arcuate apico-median emargination preceded by a slight longitudinal impression, the postero-lateral areas of sternite each with a cluster of black bristles; sternite VIII emarginate as in Fig. 1b (the drawing of the sternites given by Cameron is somewhat misleading: the emargination of sternite VIII appears too large); sternite X with a small apical emargination. Aedoeagus very small (Figs. 1c, d); aedoeagus of aberrant (?) specimens see Fig. 1f (aedoeagus in lateral view of "typical" form from Arni Gad, Mussoorie).

Remarks

The specimen examined by Assing and illustrated here in Fig. 1f, bears the following labels: "E.1.35 / Arni Gad, Mussoorie, Dr. Cameron 12.VI.21 / *Medome bicolour* [in Cameron's hand] / SYNTYPE [round BMNH label with light blue border]". It had been previously dismembered by Cameron for examination of the ventral sclerites, the parts glued to the mounting card ventral sides up. Two other specimens in the series were likewise dissected by Cameron and glued to the card on their backs, minus antennae and legs. BMNH type labels (TYPE, HOLO-, PARA-, SYN- etc.), small round labels with coloured borders, were not usually affixed by the author, but later, by museum staff. Cameron usually affixed only a single, handwritten type label worded "Genus species TYPE Cam.".



Figs. 1–4. *Medome* spp., fore-bodies (1, 2, 3, 4), male sternite VII (1a, 2a, 4a), male sternite VIII (1b, 2b, 4b), male sternite IX (4e), and aedoeagus in lateral (1c, 1f, 2c, 3c, 4c), ventral (1d, 4d), and dorsal (2d) views. – **1**. *M. bicolor*, aberrant (?) ex. from Katrain (1, 1a, 1b, 1c, 1d), ex. from Arni Gad, Mussoorie (1f). **2**. *M. siamensis* n. sp. **3**. *M. schawalleri* n. sp. **4**. *M. nigra* n. sp. – Scales: 2 mm (1–4), 0.5 mm (a–f).

The two specimens with aedoeagi as in Figs. 1c and d are otherwise identical to the others, including the male secondary characters. I can only conclude provisionally that they are aberrant or deformed. A lectotype cannot be designated in case, as one hopes, CAMERON's designated type is recovered.

Katrain is in the Kullu Valley at ca. 1300 m altitude. The beetle was sifted from litter by a stream. The specimens from Uttarakhand were collected at around 2000 m altitude.

Medome siamensis **n. sp.**

Holotype (♂): Thailand, Doi Inthanon 15.III.1982, G. DE ROUGEMONT (CRO).

Paratypes: 7 exx., same data as holotype; 1 ♀, Thailand, Doi Pui 14.III.1982, G. DE ROUGEMONT (6 exx. CRO, 2 exx. SMNS).

Additional material: 1 ♂, N-Thailand, Chiang Mai, Doi Suthep 1580 m NN, 13.XI.1995, P. WUNDERLE (CVA).

Description

Fore-body see Fig. 2. Body length 3.5–4.0 mm. Proportions of holotype: length of head: 50; breadth of head: 50; length of antenna: 69; length of pronotum: 47; breadth of pronotum: 47; length of elytron: 72; breadth of elytra: 65; length of metatarsus: 34.

On average slightly smaller and broader than *M. bicolor*, and the base of head is concave, not rectilinear. Colouration as in *M. bicolor*, but less variable; head and pronotum always dark reddish brown; elytra clearly tricolorous, fuscous, the anterior margin dark reddish, concolorous with pronotum, the posterior margin yellowish testaceous. Sculpture of fore-body as in *M. bicolor*.

Male: sternite VII (Fig. 2a), apical emargination of characteristic shape, the deepest part of emargination slightly produced in the centre; with a broad shallow impression in front of this, anteriorly with sparse recumbent very pale pubescence, posteriorly impunctate and devoid of pubescence or setae; on either side of the impression with a number of dark spicules obliquely directed inwardly, on either side of this area with a dense mass of stout dark setae; many of the spicules and setae have been rubbed off, especially on the left side in the specimen illustrated, but the insertion points are still clearly visible; sternite VIII (Fig. 2b), with a small sub-triangular emargination with rounded fundus, a little broader than in *M. bicolor*, the sides of sternite with fairly sparse black setae of varying length. Aedoeagus (Figs. 2c, d) with a very large and salient ventral blade, bi-furcate in lateral view, greatly expanded in ventral and dorsal views [the aedoeagus, Fig. 2d, was photographed in dorsal view because the shape of the apical half of the dorsal part of the blade is completely hidden in ventral view], and narrowed to a very acute apex; apex of sternite IX evenly rounded, without an emargination.

Differential diagnosis

This species is very similar to *M. bicolor* in outer appearance, only differing noticeably in its broader body; the aedoeagus is however quite different and of remarkable shape.

Remark

Doi Inthanon, the highest peak in Thailand, is about 70 km W of the city of Chiang Mai and Doi Pui as the hornbill flies. This species and other staphylinids were collected from litter in a stream gully at ca. 2200 m altitude. The collecting site on Doi Pui is at about 1400 m altitude.

Medome schawalleri **n. sp.**

Holotype (♂): [562] Nepal, Dailekh Distr., N. Dailekh, 1600 m, 1.–2.VI.1998, leg. W. SCHAWALLER (SMNS).

Description

Fore-body see Fig. 3. Body length ca. 3.8 mm. Proportions of holotype: length of head: 55; breadth of head: 55; length of antenna: 90; length of pronotum: 54; breadth of pronotum: 60; length of elytron: 58; breadth of elytra: 50; length of metatarsus: 36.

Head and pronotum black; elytra black, very obscurely rufescent on the anterior, and more narrowly on the posterior margins; abdomen black; antennae rufo-testaceous, palpi and legs testaceous, the femora uniformly darker. Sculpture of fore-body comparable to that of the two preceding species; puncturation of abdominal tergites sparser, with longer, dark recumbent pubescence (pale in the preceding species).

Male: sternite VII with a small, rounded, shallow emargination with a few short dark setae on either side; sternite VIII with a small sub-triangular emargination with rounded fundus; sternites VII and VIII were lost (detached from mounting card), so cannot be illustrated; sternite IX with a large sub-triangular emargination. Aedoeagus see Fig. 3c, very large, with a salient preapical process.

Differential diagnosis

M. schawalleri n. sp. is the smallest member of the genus. It is easily distinguished from all the other species of *Medome* by the slightly shiny elytra with much finer and sparser puncturation and the male secondary and very distinctive primary sexual characters.

Medome nigra **n. sp.**

Holotype (♂): Burma, Anisakan 16.I.1981, G. DE ROUGEMONT (CRO).

Paratype: 1 ♀, Thailand, Doi Pui 14.III.1982, G. DE ROUGEMONT (CRO).

Description

Fore-body see Fig. 4. Body length 4.0–4.2 mm. Proportions of holotype: length of head: 70; breadth of head: 69; length of antenna: 130; length of pronotum: 65; breadth of pronotum: 64; length of elytron: 72; breadth of elytra: 65; length of metatarsus: 44.

Fore-body entirely black; abdominal tergites fuscous; palpi testaceous; mandibles and antennae rufo-testaceous; legs testaceous, the distal half of femora infuscate. Sculpture of head comparable to that of the other species but somewhat coarser. Sculpture of pronotum strigose, as in the other species, but the carinae thicker and more salient, perfectly smooth (catenulate, i. e. the carinae indented at short intervals) in *M. schawalleri*. Puncturation of elytra much sparser than in other species, the interstices at least as wide as diameter of punctures, the surface therefore distinctly shiny. This is the largest species of the genus.

Male: apical margin of sternite VII (Fig. 4a) entirely emarginated in characteristic way, the sides of emargination slightly asymmetrical, the median portion produced into a large salient lobe apparently consisting of two or more layers of chitin, translucent at apex, with a thick additional layer under the surface, appearing as two elongate reddish lobes; surface of sternite with sparse pale pubescence. The postero-lateral areas with a few large stout setae; emargination of sternite VIII (Fig. 4b) larger and deeper than in other species, the postero-lateral areas of sternite with a few very large stout setae; apical emargination of sternite IX (Fig. 4e) broad, shallow, the apico-lateral angles rounded. Ventral blade of aedoeagus (Figs. 4c, d) with a very salient preapical process in lateral view (Fig. 4c), but not visible in ventral view (Fig. 4d), which also shows that the lateral faces of the process are curved upwards so that the process is U-shaped in cross section, like a scoop or trough.

Differential diagnosis

This new species is readily distinguishable from other *Medome*, even by its external characters: it is the largest member of the genus, and the combination of dark colour and very thick and salient carinae of the pronotum also differs from other species.

Remark

Anisakan is the site of waterfalls in a lushly forested valley at ca. 1000 m altitude near the hill town of Maymyo, about 65 km NE of Mandalay. The type was sifted from moist litter by the falls.

4 Key for identification of the known species of *Medome*

1 Head, and pronotum usually reddish-brown, elytra usually clearly bi- or tricolorous. – Species from India or Thailand. **2**

– Fore-body predominantly black; elytra obscurely bicolorous in one species. – Species from Nepal, Burma or Thailand. **3**

2 Narrower species, pronotum about as long as broad; base of head rectilinear; fore-body see Fig. 1; male sexual characters see Figs. 1a–f. – NW India. ..... ***bicolor*** Cameron

– Broader species, pronotum distinctly transverse; base of head broadly excavate, the rounded postero-lateral angles therefore salient; fore-body see Fig. 2; male sexual characters see Figs. 2a–d. – Thailand..... ***siamensis*** **n. sp.**

3 Head and pronotum black, elytra black, the latter with obscurely dark reddish anterior and posterior margins; elytra dull, their puncturation coarse and close, sub-rugose; fore-body see Fig. 3; aedoeagus see Fig. 3c. – Nepal..... ..... ***schawalleri*** **n. sp.**

– Fore-body entirely black; elytra shiny, their puncturation fine and sparser, the interstices equal to or larger than diameter of punctures; fore-body see Fig. 4; male sexual characters see Figs. 4a–e. – Burma, Thailand..... ***nigra*** **n. sp.**

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On the taxonomy and phylogeography of the *Scopaeus obscuripes* species group from Central Asia and the Middle East (Coleoptera: Staphylinidae: Paederinae)

Johannes Frisch

Abstract

The *Scopaeus obscuripes* species group is distributed in Central Asia and the Middle East. Two phylogenetic lineages are distinguished, the *S. obscuripes* lineage, comprising *S. asiaticus* Bernhauer, 1915 (Tadzhikistan, Uzbekistan), *S. kabakovi* Gusarov, 1994 (Afghanistan, Pakistan), and *S. obscuripes* Cameron, 1931 (India), and the *S. likovskyi* lineage, comprising *S. likovskyi* Boháč, 1988 (Afghanistan, Kyrgyzstan, Tadzhikistan, Uzbekistan) and five new species from Kyrgyzstan: *S. apiculatus* **n. sp.**, *S. chatkalensis* **n. sp.**, *S. milkoi* **n. sp.**, *S. moriturus* **n. sp.**, and *S. schawalleri* **n. sp.** *Scopaeus caspius* **n. sp.** from Azerbaidzhan and *S. klapperichi* Frisch, 2008 from Afghanistan cannot be assigned to either lineage. A lectotype is designated for *S. asiaticus*, and the subgenus-group taxon *Asiascopaeus* Coiffait, 1984, the type species of which is *S. asiaticus*, is synonymized with *Scopaeus* s. str. Erichson, 1839. *Scopaeus asiaticus*, *S. likovskyi*, and the new species are diagnosed and their habitus and male and female genital characters are figured as well as the female primary genital characters of *S. kabakovi*. The distribution of *S. obscuripes* is revised, *S. kabakovi* is recorded for Kabol for the first time, the first records of *S. likovskyi* from Kyrgyzstan are presented, and records of *S. asiaticus* for Afghanistan, Iran, and Turkmenistan are rejected. The members of the *S. obscuripes* species group are keyed, and their distribution is mapped with consideration of the new and revised records. The previously unknown female primary genital characters corroborate the hypothesis of a monophyletic *S. obscuripes* species group, the phylogeography of which is discussed.

Keywords: Staphylinidae, Paederinae, *Scopaeus*, Central Asia, Tien Shan, Alai, Pamirs, Himalayas, Azerbaidzhan, new species, distribution, phylogeography.

Zusammenfassung

Die *Scopaeus obscuripes*-Artengruppe ist in Zentralasien und im Nahen Osten verbreitet. Zwei phylogenetische Linien können unterschieden werden, die *S. obscuripes*-Linie, die *S. asiaticus* Bernhauer, 1915 (Tadschikistan, Usbekistan), *S. kabakovi* Gusarov, 1994 (Afghanistan, Pakistan) und *S. obscuripes* Cameron, 1931 (Indien) umfasst, sowie die *S. likovskyi*-Linie mit *S. likovskyi* Boháč, 1988 (Afghanistan, Kirgisistan, Tadschikistan, Usbekistan) und fünf neuen Arten aus Kirgisistan: *S. apiculatus* **n. sp.**, *S. chatkalensis* **n. sp.**, *S. milkoi* **n. sp.**, *S. moriturus* **n. sp.** und *S. schawalleri* **n. sp.** *Scopaeus caspius* **n. sp.** aus Aserbaidschan and *S. klapperichi* Frisch, 2008 aus Afghanistan können keiner dieser Linien zugeordnet werden. Ein Lectotypus wird designiert für *S. asiaticus*, und die Untergattung *Asiascopaeus* Coiffait, 1984, deren Typusart *S. asiaticus* ist, wird mit *Scopaeus* s. str. Erichson, 1839 synonymisiert. Die diagnostischen Merkmale von *S. asiaticus*, *S. likovskyi* und den neuen Arten werden beschrieben. Der Habitus und die männlichen und weiblichen Geschlechtsmerkmale dieser Arten werden abgebildet, ebenso wie die primären weiblichen Geschlechtsmerkmale von *S. kabakovi*. Die Verbreitung von *S. obscuripes* wird revidiert, *S. kabakovi* erstmals für Kabul gemeldet, die ersten Nachweise von *S. likovskyi* aus Kirgisistan werden vorgelegt, und Meldungen von *S. asiaticus* aus Afghanistan, Turkmenistan und dem Iran zurück gewiesen. Ein Bestimmungsschlüssel für die Angehörigen der *S. obscuripes*-Artengruppe wird vorgelegt, und die Verbreitung der Arten wird unter Berücksichtigung neuer und revidierter Daten auf topographischen Karten dargestellt. Die Phylogeographie der *S. obscuripes*-Gruppe, deren Monophylie von Merkmalen der bislang unberücksichtigt gebliebenen primären weiblichen Geschlechtsorgane gestützt wird, wird diskutiert.

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1 Introduction

Both diversity and phylogeographic relationships of the speciose, predominantly riparian paederine genus *Scopaeus* Erichson, 1839 in Central Asia still remains to be seen. While my revisionary works on the genus, which currently comprises 457 valid species worldwide, yielded about 100 species in the Mediterranean and the Middle East alone, only 16 previously named species of *Scopaeus* are hitherto known from Central Asia, four of which I added only recently (Frisch 2014). My studies in the framework of a cooperation of the Museum für Naturkunde Berlin and the Institute of Biology and Pedology of the Academy of Sciences of the Republic of Kyrgyzstan, however, point to a rich diversity of *Scopaeus* in the Central Asian mountains. As far as known presently, the Central Asian mountain systems must be looked upon as the evolution centre of two distinct phylogenetic lineages of *Scopaeus*. While the moderately speciose *S. similis* species group (Frisch 2014) includes the most widespread and common-most Central Asian species of the genus, the *S. obscuripes* group, subject of this contribution, obviously constitutes a speciose clade with a high percentage of endemics of particular mountain ranges and river systems.

I erected the *S. obscuripes* species group for *S. kabakovi* Gusarov, 1994 from the Hindukush and Kashmir, *S. likovskyi* Boháč, 1988 from the Alai and Hindukush Mountains, and *S. obscuripes* Cameron, 1931 from the Siwalik Range, Lesser Himalayas, and proposed a monophyletic lineage based on the short or vestigial dorsal lobe and the enlarged flagellum of the aedeagus (Frisch 1999a). Later I added *S. klapperichi* from Afghanistan (Frisch 2008). Meanwhile I recognized *S. asiaticus* Bernhauer, 1915 to be another representative of the *S. obscuripes* group and received the first species of that clade from the Middle East. In the course of my expeditions to Kyrgyzstan in recent years, I moreover discovered five close relatives of *S. likovskyi* in the Tien Shan and Alai Mountains.

In this article, I first synonymize the subgenus-group name *Asiascopaeus* Coiffait, 1984, the type species of which is *S. asiaticus*, with the type subgenus *Scopaeus* s. str. Erichson, 1839, followed by contributions to the taxonomy, biogeography, and phylogeny of the *S. obscuripes* species group.

Acknowledgements

I am indebted to the curators and private collectors mentioned in the material chapter, who made this study possible by lending specimens to me. Aleksandr Ryvkin, Moscow, kindly scattered my doubts that the provenance of *Scopaeus caspius* n. sp. is correct. I thank Elke Siebert and Hwa Ja Goetz, Museum für Naturkunde Berlin, for their graphical support. Mary-Alice Small, Manas Recources Limited, Bishkek, kindly funded my search for *S. moriturus* n. sp. in the Isfairam-Say River System in 2013. I sincerely thank Lee Herman, American Museum of Natural History, New York, for the linguistic and scientific improvement of this manuscript and his friendly support over the years. Harald Schillhammer, Naturhistorisches Museum, Wien, kindly proof-read the manuscript. Last but not least, I thank my dear colleagues Nassima Bashirova, Dmitry Milko, and Usubalijew Almasbek Sadygalijewitsch of the Institute of Biology and Pedology of the Academy of Sciences of the Republic of Kyrgyzstan in Bishkek for organizing our successful expeditions and their friendly company in the field. My expeditions to Kyrgyzstan were funded by the Museum für Naturkunde Berlin and the German Academic Exchange Service (DAAD).

2 Material and methods

Material

The specimens referred to in this contribution, including most holotypes of the species described herein, are stored in the Museum für Naturkunde Berlin (MNHB) except otherwise stated (abbreviations in alphabetical order):

ASCD	Private Collection A. Shavrin, Daugavpils
BMNH	The Natural History Museum, London (R. Booth)
FMNH	Field Museum of Natural History, Chicago (A. Newton, M. Thayer)
HNHM	Hungarian Natural History Museum, Budapest (G. Macranczy, O. Merkl, G. Szél)
IBPB	Institut of Biology and Pedology of the Academy of Sciences of the Republic of Kyrgyzstan, Bishkek
MHNG	Muséum d'histoire naturelle, Geneva (G. Cuccodoro, I. Löbl)
MSCB	Private Collection M. Schülke, Berlin
MZLU	Museum of Zoology, Lund University (C. Fägerström)
MZMC	Zoological Museum of the Moscow Lomonosov State University (A. Gusakov)
NHMB	Naturhistorisches Museum, Basel (E. Sprecher)
NHMW	Naturhistorisches Museum, Wien (H. Schillhammer)
NMPC	Národni Muzeum, Prague (J. Hajek, J. Jelinek)
SDEI	Senckenberg Deutsches Entomologisches Institut, Müncheberg (L. Zerche)
SMNS	Staatliches Museum für Naturkunde, Stuttgart (W. Schawaller)
SMTD	Staatliches Museum für Tierkunde, Dresden (O. Jäger, K. Klass)
UZMH	Zoologiska Muset, Helsinki (J. Muona)
ZICP	Zoological Institute, St. Petersburg (A. Kirejtshuk)

In the compilations of type material and additional specimens examined, the label data usually are not cited verbatim but standardized and completed by province or district information to make it easier for the reader to find the respective localities. Old, nowadays uncommon locality names are replaced by the current names, but added in rectangular brackets. Labels cited verbatim stand in quotation marks. Missing GPS-coordinates on locality labels were subsequently taken from Google Earth and are indicated by rectangular brackets to distinguish them from those measured at the exact collecting site.

Methods

The habitus photographs were created with the montage software Helicon Focus based on digital images which were taken with a camera attached to a stereoscopic microscope. Transmitted-light microscopic images were made using the Zeiss Axi-

oscope imaging system and the montage software Picolay. Drawings were made using the drawing attachement U-DA of the transmitted-light microscope Olympus BX50. Laterotergites IX are illustrated without setation. The illustrations were made with the following magnifications: Specimens (Figs. 1–8): 32×; aedeagi, abdominal sclerites VIII (Figs. 9–35): 100×; laterotergites IX, lateral gonocoxal plates, abdominal tergites X (Figs. 36–45): 400×; laterotergite IX and abdominal tergite X of *Scopaeus caspius* n. sp. (Figs. 58, 59), female primary sexual characters including the attached lateral gonocoxal plates: 600× (Figures 46–57, 60, 61).

Specimens were measured magnified 140× using a stereoscopic microscope with an eye-piece linear micrometer. Measurements and ratios, means (Ø) are given in brackets, include both sexes and the maximum range of variation in body size and form. Total length of specimens = interval from apical spines of labrum to the posterior end of abdomen, depending on intensity of contraction of abdomen; forebody length = interval from apical spines of labrum to posterior margin of elytra at suture; head length = interval from anterior margin of clypeus to posterior margin of head; elytral length = interval from posterior tip of scutellum to posterior end of elytra along suture; eye length = interval from anterior to posterior end of ocular suture; both eye length and temporal length are measured in lateral view; length of antennomeres is measured without the thin basal stalk.

The morphological structures of the aedeagus are termed following Frisch et al. (2002: 31–34). The terminology of the primary and secondary sexual characters of the females follows Frisch (2010: 160, 161) except for the spermatheca the structures of which are termed after Frisch (2014: 201) based on De Marzo (2009), who examined the anatomy of the spermatheca of some genera of the Paederinae including *Scopaeus*.

The female genitals often provide species diagnostic characters in the *Scopaeus obscuripes* group and should be examined with a transmitted-light microscope. The shape of the bursa and the distance of the lateral gonocoxal plates can easily be recognized if the gonocoxal plates are folded laterally.

3 *Asiascopaeus* Coiffait n. syn. of *Scopaeus* Erichson

Asiascopaeus Coiffait, 1984: 150; subgenus of *Scopaeus* Erichson, 1839; type species: *S. asiaticus* Bernhauer, 1915; **n. syn.**

In a key to the subgenera of *Scopaeus* in the West Palaearctic only and without a sufficient description, Coiffait (1984: 150, 152) erected *Asiascopaeus* for the Middle Asian species *S. similis* Eppelsheim, 1892 and *S. asiaticus* Bernhauer, 1915, which he designated as the type species. A few years later, Boháč (1988: 441) added *S. likovskyi* from Tadzhikistan, which I already excluded from *Asiascopaeus* (Frisch 1999a: 53). Eventually, Gusarov (1991: 8) revalidated *S. triangularis* Luze, 1904, which was synonymized with *S. similis* by Coiffait (1968: 408), as another species of *Asiascopaeus*. Coiffait (1984: 150) diagnosed *Asiascopaeus* by the "strongly narrowed, stiletto-shaped apical third" of the aedeagus only – a character which does not constitute a synapomorphy of the species included and thus is not suitable to establish a taxon of supraspecific rank. The primary sexual characters of these species rather match those which Frisch et al. (2002: 38) defined as apomorphies of the nominal subgenus of *Scopaeus* Erichson, 1839. These are: Median lobe of aedeagus differentiated in two testaceous apical lobes and dorsal lobe between them; flagellum of aedeagus without surrounding denticles; chamber of sperm pump with terminal process. Hence, *Asiascopaeus* is here synonymized with *Scopaeus* s. str. based on these characters.

The species attributed to *Asiascopaeus* do not show a closer relationship. While *S. asiaticus* shares the apomorphic characters of the herein discussed *S. obscuripes* group (see Frisch 1999a: 47), both *S. similis* and *S. triangularis* belong to the *S. similis* species group, which was defined in a recent contribution (Frisch 2014).

Remark

As the supraspecific classification of the Scopaeina is currently being revised by Lee Herman, New York (pers. comm), I do not present the complete subgeneric classification and synonymy of *Scopaeus* here. While the taxonomic status of the New World subgenera described by Casey still has to be analysed, *Scopaeus* s. str., distributed worldwide, and the Palaeotropical *Hyperscopaeus* Coiffait, 1984 were corroborated as monophyletic by Frisch et al. (2002: 38) and, since *Asiascopaeus* is synonymized, constitute the valid subgenera of *Scopaeus* in the Old World.

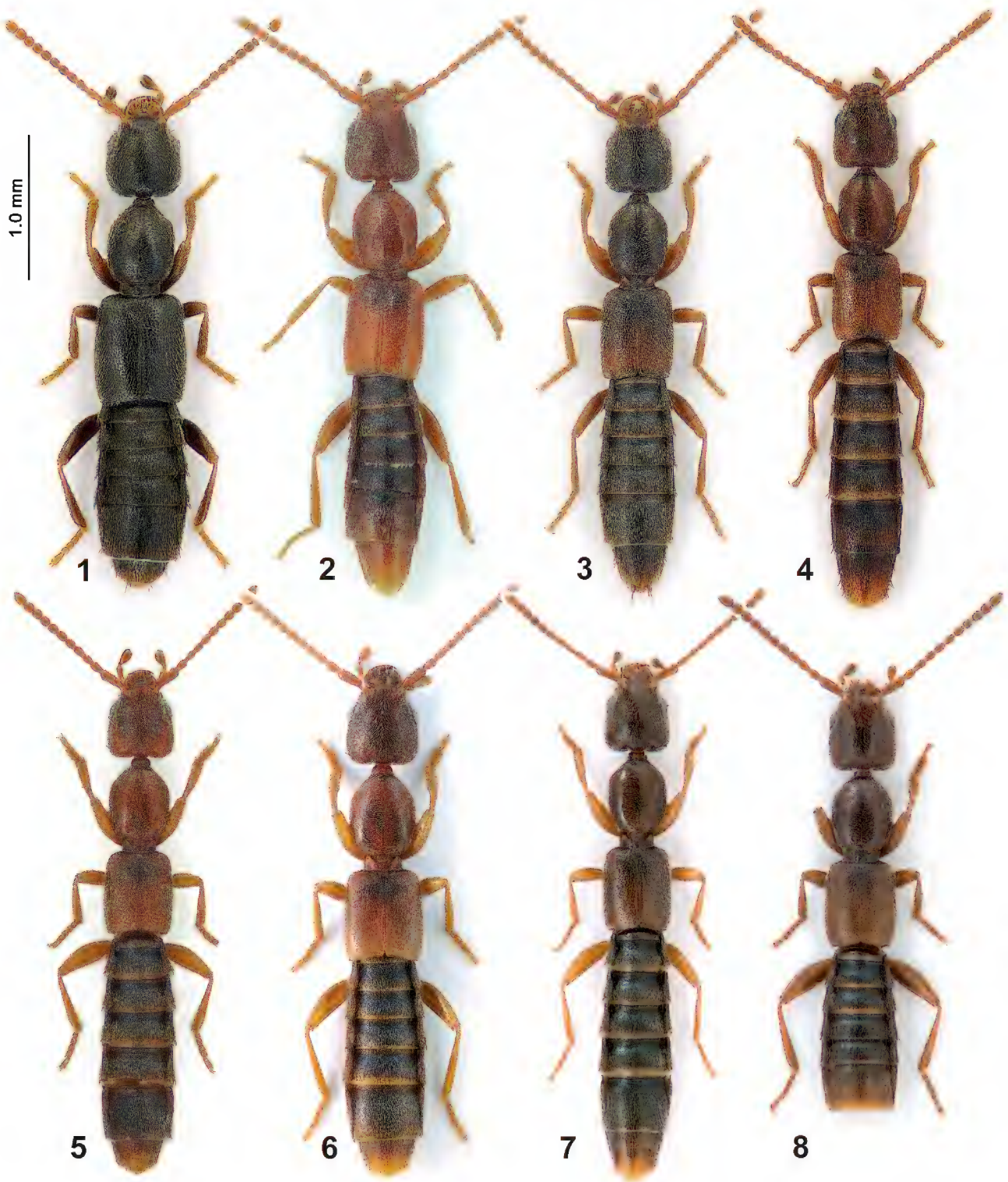
4 *Scopaeus obscuripes* species group

Below, the *Scopaeus obscuripes* species group is diagnosed including biogeographical and bionomical information and comparative notes at the species group level, followed by species chapters comprising diagnoses of the species, compilations of type specimens and additional specimens examined, and biogeographical information. The brief species diagnoses focus on distinguishing characters and do not repeat the general species group characters.

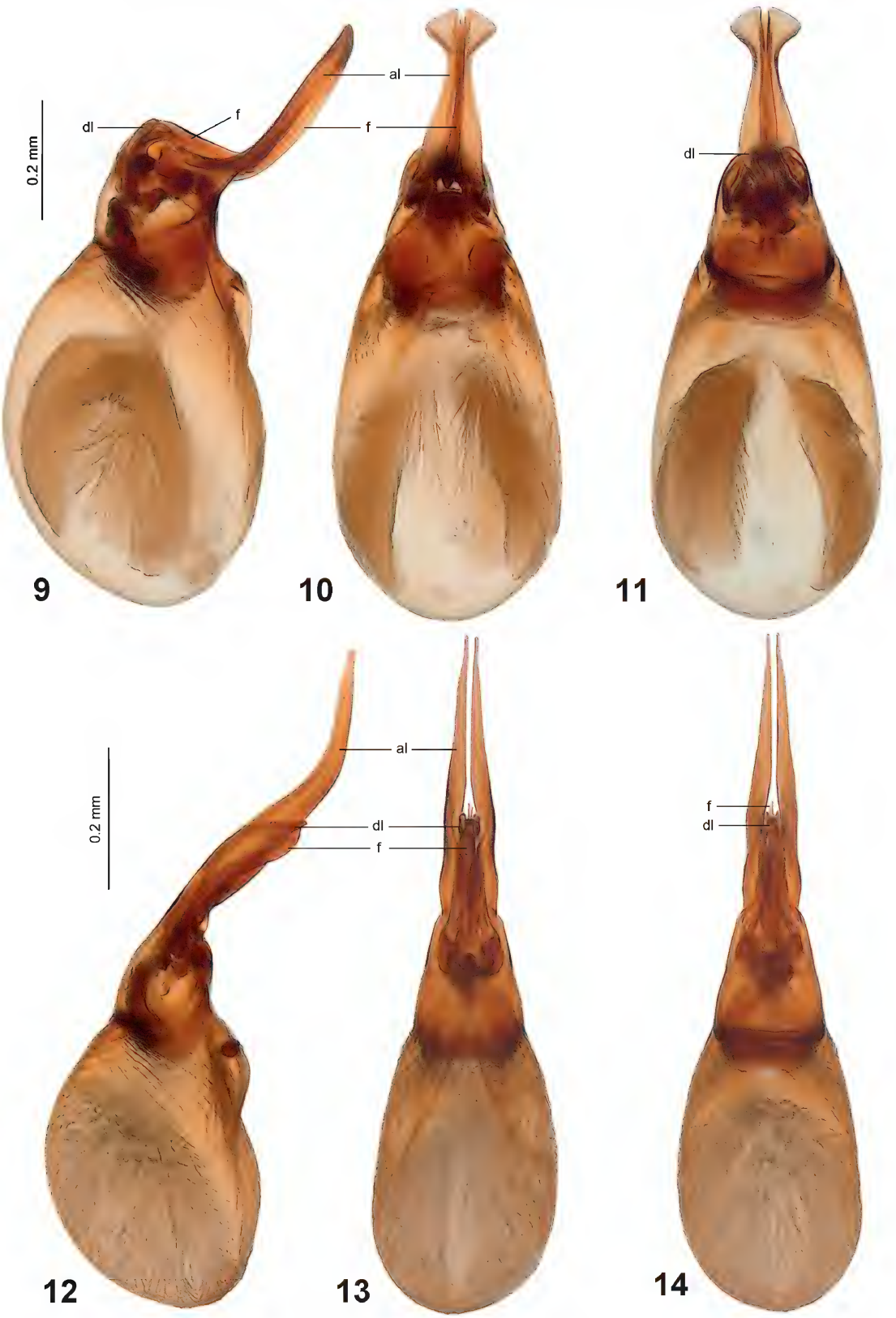
4.1 Diagnosis, distribution, bionomics, and comparative notes

Diagnosis

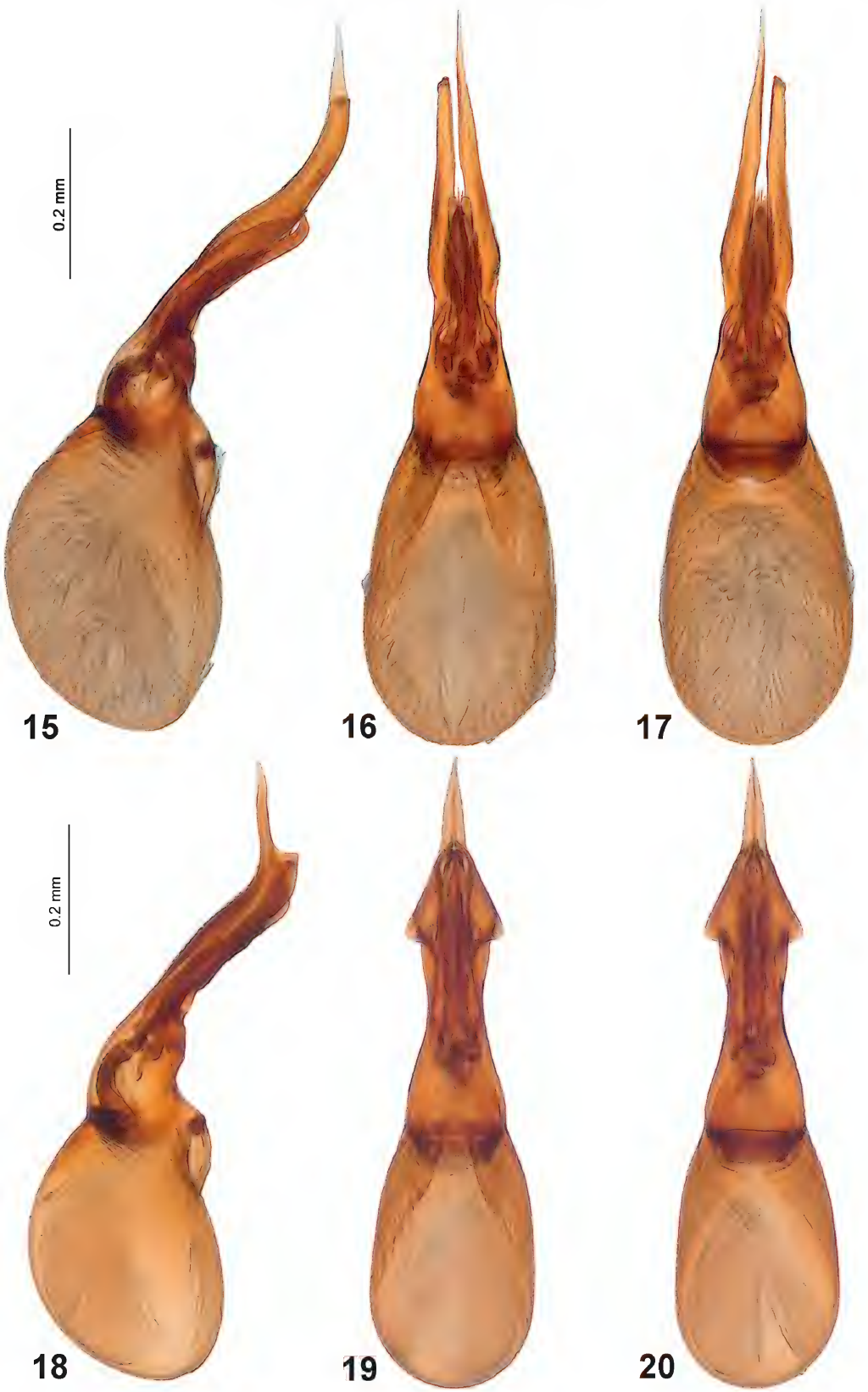
Total length ranging from 3.0–4.4 mm, forebody length from 1.8–2.1 mm. Body coloration varying from light yellowish brown with darker brown abdomen and light yellowish brown antennae, maxillary palpi, and legs to entirely black with somewhat lighter tip of abdomen and dark brown appendages (Figs. 1–8); elytra frequently lighter posteriorly in variable intensity and extent; penultimate segment of maxillary palpi usually somewhat darker brown, particularly in dark coloured specimens. Punctation of body surface typical of *Scopaeus*; forebody distinctly punctate and with intraspecifically variable microreticulation, usually more or less shiny, less frequently dull. Head 1.06–1.17 times as long as wide, across



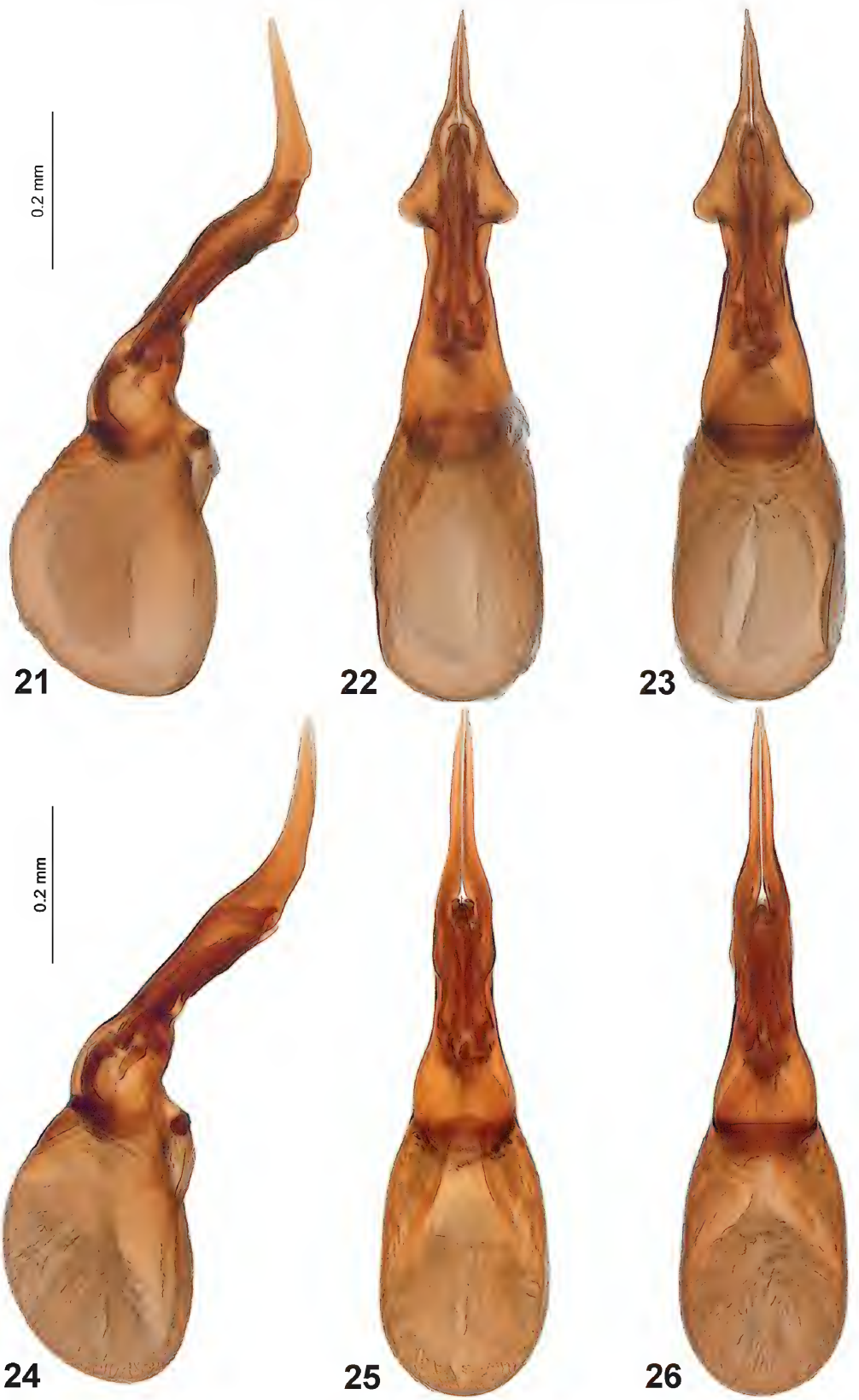
Figs. 1–8. *Scopaeus obscuripes* species group, habitus. – **1**. *Scopaeus asiaticus* Bernhauer (Tadzhikistan, Varzob: Adjuk Cleft). **2**. *S. caspius* n. sp. (holotype). **3**. *S. likovskyi* Boháč (Kyrgyzstan, Batken: Teo-Jailoo Valley). **4**. *S. milkoi* n. sp. (paratype; Kyrgyzstan, Chui, W Yurevka: Karandolot). **5**. *S. apiculatus* n. sp. (paratype; Kyrgyzstan, Jalal-Abad: Kekbel-Pass). **6**. *S. moriturus* n. sp. (paratype; Kyrgyzstan, Batken: Isfairam-Say). **7**. *S. schawalleri* n. sp. (paratype; Kyrgyzstan, Jalal-Abad: Arslanbob NP). **8**. *S. chatkalensis* n. sp. (holotype).



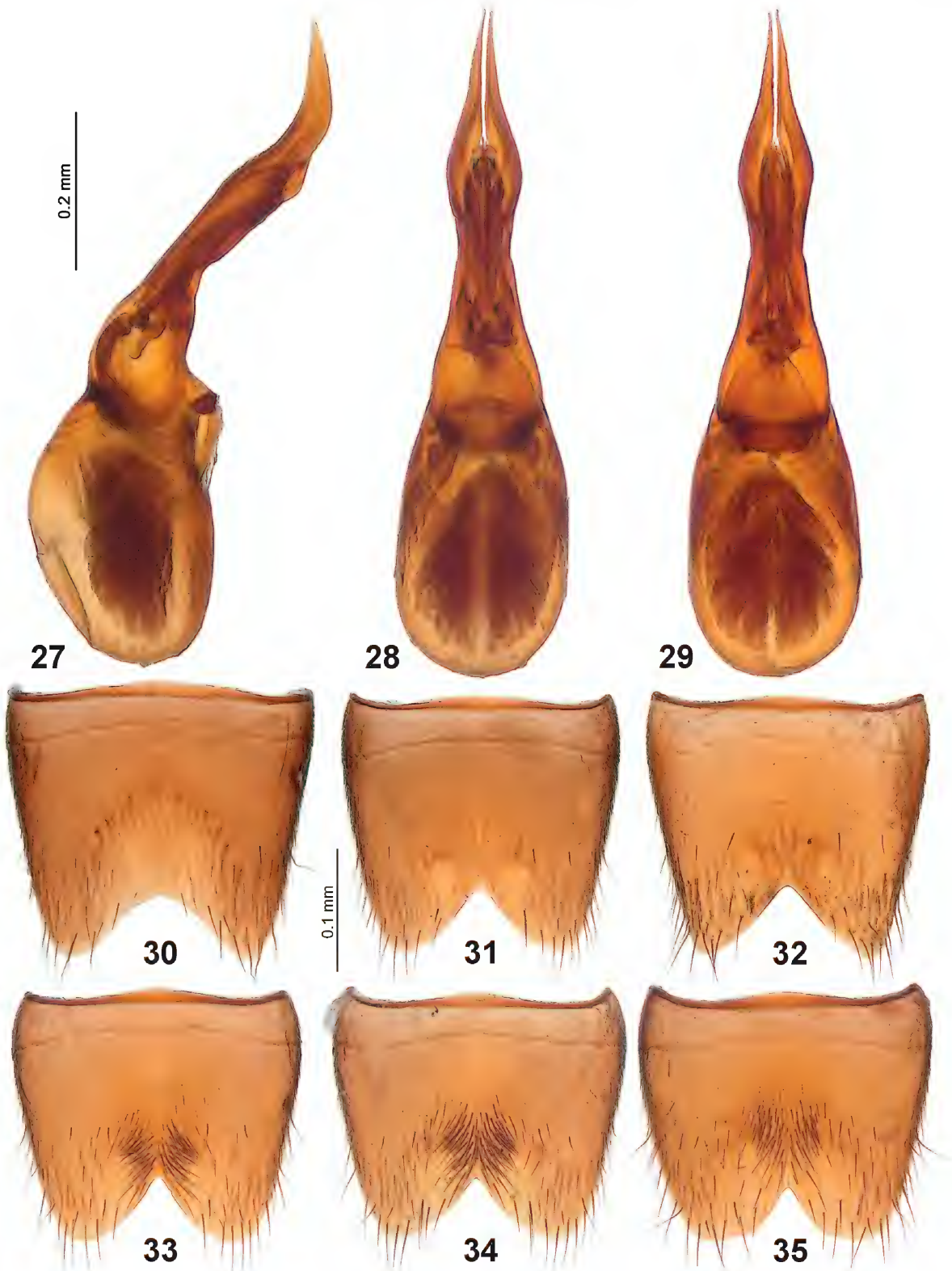
Figs. 9–14. *Scopaeus* spp., aedeagus in lateral (9, 12), ventral (10, 13), and dorsal (11, 14) view. – **9–11**. *S. asiaticus* Bernhauer (Tadzhikistan, Varzob: Adjuk Cleft). **12–14**. *S. likovskyi* Boháč (Kyrgyzstan, Batken: Teo-Jailoo Valley). – Abbreviations: al = apical lobe; dl = dorsal lobe; f = flagellum.



Figs. 15–20. *Scopaeus* spp., aedeagus in lateral (15, 18), ventral (16, 19), and dorsal (17, 20) view. – **15–17**. *S. milkoi* n. sp. (holotype). **18–20**. *S. apiculatus* n. sp. (holotype).



Figs. 21–26. *Scopaeus* spp., aedeagus in lateral (21, 24), ventral (22, 25), and dorsal (23, 26) view. – **21–23**. *S. moriturus* n. sp. (holotype). **24–26**. *S. schawalleri* n. sp. (holotype).



Figs. 27–35. *Scopaeus* spp., aedeagus in lateral (27), ventral (28), and dorsal (29) view, and male abdominal sternite VIII (30–35). – **27–29**. *S. chatkalensis* n. sp. (holotype). **30**. *S. asiaticus* Bernhauer (Tadzhikistan, Varzob: Adjuk Cleft). **31**. *S. likovskyi* Boháč (Kyrgyzstan, Batken: Teo-Jailoo Valley). **32**. *S. milkoi* n. sp. (holotype). **33**. *S. apiculatus* n. sp. (paratype, Kyrgyzstan, Jalal-Abad: Sary-Chelek). **34**. *S. moriturus* n. sp. (holotype). **35**. *S. chatkalensis* n. sp. (holotype).

tempora 0.98–1.08 times as wide as across eyes, usually notably trapezoidal. Eyes 0.44–0.76 times as long as tempora. Length of elytra subject to intra- and interspecific variation; elytra 0.90–1.13 times as long as pronotum. Lateral denticles of labrum usually somewhat shorter than median denticles, sometimes denticles of same length. Length of antennal segments somewhat variable intra- and interspecifically; segments 8 to 10 slightly transverse, quadrate, or somewhat elongate, but increasingly shorter towards end of antenna. Protarsomeres 2–4 dilated, two or three times as wide as long, in females hardly noticeable narrower. Mesotibia slender to moderately dilated, 5.6–7.3 times as long as wide. Metathoracic wings entire, based on a representative number of specimens examined.

Male: Abdominal sternite VIII with almost semicircular (Fig. 30) or triangular (Figs. 31–35) emargination in about posterior fourth to fifth of sternite length, frequently with two round, asetose impressions on either side of anterior end of posterior emargination (Figs. 31–35) and – in some species only – a conspicuous median field of long, dark, latero-posteriad orientated setae between them (Figs. 33–35). Shape of distal lobes of aedeagus (Figs. 9–29, Frisch 2008: figs. 1–12) very variable interspecifically; dorsal lobe vestigial (Figs. 1, 3) or about half as long as apical lobes, more or less widened ventrad in lateral view, and with emarginate apex at either side extended to acute tooth (Figs. 12–29); flagellum either about as long as apical lobes (Figs. 9–10) and frequently with tooth-like or lobiform modifications (Frisch 2008: figs. 1–3, 7–12) or half as long as apical lobes only and moderately curved ventrad with strongly dorsad curved end (Figs. 12–29).

Female: Laterotergite IX with tooth-like demarcation of dorsal, subapical emargination (Figs. 36, 37). Lateral gonocoxal plates variable, 2.5–5.0 times as long as wide (Figs. 38–43). Tergite X about twice as long as wide (Figs. 44, 45). Bursa with distinctly sclerotized, triangular or convex posterior end, but hyaline anteriorly (Figs. 46, 48, 49, 51–57). Length of sclerotized portion of spermathecal duct (between bursa and sperm pump) variable interspecifically, from five (Figs. 46, 48, 49) to 12 times (Figs. 51, 52) as long as sperm pump.

Distribution and bionomics

The *Scopaeus obscuripes* species group is widely distributed in the mountains of Central Asia and also present in the Caspian Plain east of the Talysh Mountains of Azerbaidzhan (Figs. 62, 63). Up to now, the clade is known from the northern Tien Shan at 42°44′N 74°55′E across the western Tien Shan and western Alai Mountains as far south as 34°36′N 69°10′E (Kabol) in the Hindukush Mountains (Frisch 2008: 283) and 30°41′N 77°52′E (Chakrata) in the Siwalik Range, Indian Lesser Himalayas (Cameron 1931: 174). The area of distribution of the *S. obscuripes* group is delimited towards north by the Central Asian steppe, which constitutes a natural distribution barrier for hygrophilous species. The eastern and southern limit of distribution is, however, unknown due to the lack of records from most of eastern and southern Central Asia, but I expect the *S. obscuripes* group to be widespread and speciose in the eastern Tien Shan, Pamirs, and Himalayas.

The species in the foothills of the Talysh Mountains appears to be isolated from the Central Asian distribution centre of the *S. obscuripes* group, since no records became known from the South Caspian and Turkmeno-Khorassanian mountain ranges in between, though I collected there several times. The presence of *S. asiaticus* in the western Koppe Dag (Bernhauer 1915: 266) is unlikely (see chapter Type material under *S. asiaticus* below).

Judging from label data and according to my own field experience, the members of the *S. obscuripes* species group inhabit the banks of flowing waters. Like the majority of *Scopaeus*, they are hygro-thermophilous dwellers of the uppermost interstice of damp, sandy or gravelly soil with poor vegetation and predominantly dwell in riparian habitats (Frisch et al. 2002: 28). Species of the *S. obscuripes* group were collected at elevations from about sea-level in the Caspian Plain up to about 3500 m in the Hindukush Mountains, which is not surprising since the vertical distribution of *Scopaeus* in general depends more on suitable habitats than on the altitude (Frisch et al. 2002: 28).

Comparative notes

Among Central Asian *Scopaeus*, members of the *S. obscuripes* species group can most easily be confused with species of the *S. similis* group (Frisch 2014) according to their general appearance. Members of these sympatric species groups inhabit similar niches, which is why they often live syntopically and samples are frequently mixed. Apart from the fact, that in the *S. similis* group the abdominal tergite VIII of the males lacks latero-posterior depressions and a median field of long, dark setae (Frisch 2014: figs. 28–33), I did not recognize ectomorphological characters which facilitate a reliable distinction of the members of both species groups. Therefore, accurate identification requires the examination of the male and female primary sexual characters. Males of the *S. similis* group can easily be distinguished by the characteristic set of distal lobes of the aedeagus, most of all the apical, triangular enlargement of the thin, straight apical lobes and the long, straight, slender dorsal lobe with two weakly sclerotized, lobiform ends (Frisch 2014: figs. 7–27). Females of the *S. similis* group differ by the obtuse demarcation of the apico-dorsal emargination of laterotergite IX (Frisch 2014: figs. 34–36) and the entirely hyaline bursa without sclerotized posterior end (Frisch 2014: figs. 40–45).

Members of the *S. obscuripes* group can also be confused with species of the Pontomediterranean and Middle

Eastern *S. elegans* species group (Frisch et al. 2002: 41, 42). As far as known presently, both clades live sympatrically in the foothills of the Talysh Mountains in the Caspian Plain of Azerbaidzhan. Males of the *S. elegans* group can easily be distinguished by the remarkable, flagelliform ventral endophallic process of the aedeagus (Frisch 2010: figs. 67–79). Though in this clade the bursa is posteriorly sclerotized as well or even entirely sclerotized, it is considerably smaller. Females of the *S. elegans* group differ moreover by the notably longer, tangled spermathecal duct between bursa and sperm pump (Frisch 2010: fig. 80).

The trans-Palaearctic *S. laevigatus* (Gyllenhal) can easily be distinguished from dark coloured specimens of the *S. obscuripes* group by the deep, wide, round emargination of abdominal sternite VIII of the males, which at either side is delimited by two long, posterior teeth (Frisch 2003: fig. 61), the different shape of the aedeagus with setiferous lateral lobes (Frisch 2003: figs. 1–3), and the entirely sclerotized bursa of the female genital aperture (Frisch 2003: fig. 127).

Central Asian species of the *S. sericans* (Frisch 2012), *S. signifer* (Frisch et al. 2002: 39, 40), and *S. debilis* (Frisch 1999b) species groups strongly differ from the *S. obscuripes* group in their general appearance, most of all in the very finely and densely punctate, mat body surface, the slender head with large eyes, parallel temples and strongly convex posterior angles (except for *S. turkestanicus* with trapezoidal head; Frisch 2012: 291), and the slender protarsomeres 2–4, which are only twice as wide as long in the two former clades and even quadrate in the *S. debilis* species group. Compared to the *S. obscuripes* group, the aedeagus of all of the species of these three basal clades of *Scopaeus* (Frisch et al. 2002: 37, phylogenetic tree) has much shorter distal lobes and setiferous lateral lobes. The females can easily be distinguished by the entirely hyaline bursa, but they moreover differ by the following characters. Females of the *S. sericans* group can be distinguished by the shorter, evenly curved sclerotized portion of the spermathecal duct and the small extension at the junction of the hyaline spermathecal duct with the sperm pump (Frisch 2012: figs. 31–41), which is however subject to intraspecific variation and often lacking. In the *S. signifer* group, the sperm pump is characterized by adjoining junctions of the spermathecal duct (Frisch 2012: figs. 42–44). The sperm pump of *S. debilis*, the only Central Asian species of that group, differs by a septum within the chamber segment (Frisch 2012: fig. 45).

4.2 *Scopaeus asiaticus* lineage

Diagnosis and distribution

The *Scopaeus asiaticus* lineage is here erected for the members of the *S. obscuripes* species group with a vestigial dorsal lobe of the aedeagus and a remarkably lengthened flagellum, which often has tooth-like or lobiform ventral modifications. Further diagnostic characters of this clade are unknown. As far as known presently (Fig. 62), it is distributed from the Alai Mountains (*S. asiaticus* Bernhauer) south to the Hindukush and Kashmir (*S. kabakovi* Gusarov) and the Siwalik Range, Lesser Himalayas (*S. obscuripes* Cameron).

Scopaeus asiaticus Bernhauer
(Figs. 1, 9–11, 30, 37, 42, 44, 46–48, 62)

Scopaeus asiaticus Bernhauer, 1915: 265.
Scopaeus (s. str.) *asiaticus*; Coiffait 1968: 407.
Scopaeus (Asiascopaeus) asiaticus; Coiffait 1984: 152, 176.

Type material

Lectotype ♂, Tadzhikistan: Voruch Exclave [39°51′19″N 70°33′35″E]: Tschitschantan, 1898, leg. Hauser; labelled "Ost-Buchara. Tschitschantan. Coll. Hauser 1898.", "*asiaticus* Bhn. Typus." (FMNH); here designated (7th abdominal sternite strongly damaged through improper genital dissection).

Paralectotypes (7 specimens): 2♂♂, same locality as lectotype (NHMW); labelled "Ost-Buchara. Tschitschantan. Coll. Hauser 1898.", "*asiaticus* Bernh." (NHMW). 1♀, same locality as lectotype; labelled "Ost-Buchara Tschitschantan Nufswald F. Hauser 1898", "*asiaticus* Bnh. Cotypus." (FMNH). 2♀♀ (attached to the same pin), Tadzhikistan, Hation, SEE Dushanbe: Baljuvon (Vakhsh Mts.) [38°28′47″N 69°43′07″E], 924 m, 1898, leg. Hauser; labelled "Mts. Karateghin Baldschuan 924 m. F. Hauser 1898", "*Scopaeus asiaticus* Bnh det. Bernh." (NHMW). 1♀, Turkmenistan: Kizyl-Arvat; labelled "Transcasp. Kisil-Arvat", "Collect. Hauser" (NHMW). 1♀, same locality; labelled "Transcasp. Kisil-Arvat", "*asiaticus* Bnh. Copypus." (FMNH). I attached lectotype and paralectotype labels, respectively.

Additional material examined (65 specimens)

"Buchara Bang-Haas" (BMNH); "Turkestan Buchara" (HNHM). — **Tadzhikistan**: "Hissar Buchara" (NMPC, SMTD, UZMH); "Turkestan Mts. Ghissar F. Hauser 1898" (NHMW). Nohijahoi tobei Dschumhurij: NEE Dushanbe, near Garm: Saripul [Sary-pul] (Karategin Mts.) [39°06′00″N 70°45′50″E], 1482 m, 1898, leg. Hauser (NHMW); NE Dushanbe: Romit Gorge [38°44′00″N 69°20′00″E], 18.VII.1984, leg. Wrase (MSCB); N Dushanbe, Varzob: Adjuk Cleft (Gissar Mts.) [38°46′25″N 68°48′00″E], 1200 m, 1.–3.VII.1990, leg. Schülke (MNHB, MSCB); Varzob: Campus Chaika (38°46′24″N 68°49′04″E), 1110 m, 7.–8.VII.2012, leg. Valainis (MNHB, ASCD); NEE Dushanbe, 15–20 km S Garm: Childara [Tshil-Dara] (Peter-I.-Mts.) [38°46′52″N 70°18′22″E], 1700–2300 m, 21.–24.VI.1990, leg. Schülke & Wrase (MNHB, MSCB); 15 km S Norak [Nurek] [38°20′14″N 69°14′29″E], 1000–1300 m, 14.–17.IV.1992, leg. Kasantsev (NHMB). Sughd: S Panjakent: Rudaky (Zeravshan Mts.), 1500 m, 11.VII.1990, leg. Schülke & Wrase (MSCB); Panjakent-Urmetan, S Navabad: Zavron Valley (Zeravshan Mts.) [39°20′00″N 67°54′46″E], 2100–3000 m, 12./13.VII.1990, leg. Schülke & Wrase (MSCB). — **Uzbekistan**: Qashqardaryo: SE Shahrisabz: Igrisu (Katta-Uru River) [38°38′11″N 67°04′30″E], 26.VII.1942, leg. Arnoldi (MZMC). Surxondaryo: NNE Denov: Karatag [Karatack Buchara] [38°23′16″N 68°07′26″E] (SDEI).

Diagnosis

Total length 3.3–3.8 mm (Ø 3.5), forebody length 1.8–2.0 mm (Ø 1.9). Body usually uniformly dark brown to black with brown antennae, brown maxillary palpi with blackish penultimate segment, and brown to blackish brown legs (Fig. 1); elytra frequently dark reddish brown posteriorly to variable extent; body coloration rarely lighter brown. Head 1.10–1.15 (Ø 1.12) times as long as wide, subquadrate with strongly rounded posterior angles, across tempora only 0.98–1.02 (Ø 1.0) times as wide as across large eyes, which are 0.59–0.76 (Ø 0.66) times as long as tempora. Elytra comparatively long, 1.08–1.17 (Ø 1.13) times as long as pronotum. Lateral denticles of labrum notably shorter than median denticles. Protarsomeres 2–4 moderately transverse, only twice as wide as long. Mesotibia slender, 6.0–7.2 (Ø 6.5) times as long as wide.

Male: Abdominal sternite VIII almost semicircularly emarginate posteriorly, without lateral impressions and median field of dark setae (Fig. 30). Apical lobes and flagellum of aedeagus (Figs. 9–11) at their bases strongly bent ventrad; apical lobes in lateral view extraordinarily thin, flagellum therefore visible for most of its length; apical lobes distally of ventrad pointing bases almost semicircularly curved in longitudinal direction and straight towards subacute ends, in dorsal and ventral view gradually tapered distad, but in almost apical fourth laterally strongly enlarged triangularly; proximal third of flagellum strongly right-angled snapped ventrad and projecting distally from thin, ventrad pointing bases of apical lobes, after that almost semicircularly curved in longitudinal direction and running ventral of apical lobes.

Female: Lateral gonocoxal plates slender, about four times as long as wide (Figs. 42, 46, 48). Bursa slender with round or triangular sclerotized posterior end and very fine, deciduous anterior end usually collapsed in slide preparates (Figs. 46, 48). Sclerotized portion of spermathecal duct, compared to relatives of the *S. obscuripes* group, thick and short, about five times as long as sperm pump only (Figs. 46, 48).

Type series and lectotype designation

Bernhauer (1915: 265, 266) described *Scopaeus asiaticus* from an unknown number of specimens from Tschitschantan (current locality name?) and Baljuvon in the Alai Mountains of Tadzhikistan and Kizyl-Arvat in western Turkmenistan, but he did not communicate the collector and storage of the specimens. Moreover, he did not designate a holotype. The Bernhauer collection at the FMNH holds one male and one female from Tschitschantan collected by Friedrich Hauser and one female from Kizyl-Arvat. These specimens from type localities of *S. asiaticus* are doubtlessly syntypes, because their characters agree with Bernhauer's description and, judging from the example of Bernhauer's identification labels in Horn et al. (1990: 476), Bernhauer himself had labelled the male from Tschitschantan "*asiaticus* Bnh. Typus." and the females "*asiaticus* Bnh. Cotypus.". Specimens from the third type locality, Baljuvon SEE of Dushanbe, are absent from the Bernhauer collection at the FMNH, but two females from Baljuvon are present at the NHMW, which moreover holds additional specimens of *S. asiaticus* from Tschitschantan and Kizyl-Arvat. None of the specimens at NHMW bear identification labels of Bernhauer, but, judging from their locality labels, they originate from the same series as the syntypes at the FMNH collected by F. Hauser in 1898. The two females from Kizyl-Arvat, however, provide no information as regards collecting date and collector, but they are old specimens of the 19th century, and the specimen at the NHMW has a small label "Collect. Hauser" which had certainly been attached after this collection was given to Vienna in 1920 (see Horn et al. 1990: 161). I conclude that Bernhauer based his description of *S. asiaticus* on specimens he studied in the Hauser collection which is why I consider the specimens at the NHMW as syntypes as well. Obviously, Bernhauer subsequently put his type labels only at those three specimens which he kept for his own collection.

A lectotype designation to stabilize the name *asiaticus* Bernhauer, 1915 is necessary, because the conspecificity of the syntype series is not certain. Only the series from Tschitschantan in the Tadzhikian exclave Voruch includes males. They match the interpretation of *S. asiaticus* by Coiffait (1968: 407–409; 1984: 151, 176), who was the first to illustrate the aedeagus of this species. From Baljuvon southeast of Dushanbe and Kizyl-Arvat in western Turkmenistan close to the Caspian Sea, however, only females are available. I have no doubts that the females from Baljuvon are conspecific to those from Tschitschantan, because they look alike, share the characteristic primary and secondary genital characters, and *S. asiaticus* is known to be widespread around Dushanbe (Fig. 62). The conspecificity of the females from Kizyl-Arvat in western Turkmenistan with *S. asiaticus* is, however, doubtful. Even though I cannot distinguish them from females from Tadzhikistan either by ectomorphological or genital characters (Figs. 49, 50), the presence of a relict population of *S. asiaticus* separated from the Alai Mountains by 1000 km steppe is unlikely. The respective specimens are either mislabelled or represent another closely related species.

I select the male syntype from Tschitschantan preserved at the FMNH for the lectotype designation, because it is in accord with the original description and subsequent descriptions (Coiffait 1968: 407, 408; 1984: 176), originates from the Bernhauer collection (recommendation 74D, ICZN 1999: 157), and has already been labelled as type by Bernhauer.

Distribution

As far as known presently, *Scopaeus asiaticus* is endemic to the western Alai Mountains, where it was found as far east as 70°45′E (Fig. 62). Examined specimens originate from Tadzhikistan and Uzbekistan. The source for the record for Uzbekistan in SMETANA (2004: 615) is unknown to me.

In view of the verified distribution pattern of *S. asiaticus*, the record from Iran (Mazandaran: Amol: GHAHARI et al. 2009, SAMIN et al. 2011: 146) is implausible and rejected as well as the dubious origin Kizyl-Arvat, Turkmenistan, of two probably mislabelled female type specimens of *S. asiaticus* (see chapter Type material above). The record for Afghanistan (Qadés: SW Qal'eh Naou: SCHEERPELTZ 1963: 10) is based on a misidentified female specimen of *S. laevigatus* (Gyllenhal) in MZLU, which I examined. SCHEERPELTZ's (1963: 10) erroneous concept of the distribution of *S. asiaticus*, according to which the species occurs throughout southeastern Turkmenistan, northern Iran, and Afghanistan, is reflected in the current Catalogue of Palaearctic Coleoptera (SMETANA 2004: 615).

Remark

BERNHAUER (1923: 180) published distinguishing characters for *S. asiaticus* and *S. schneideri* Bernhauer, 1900. The latter name for the black coloured population of *S. laevigatus* (Gyllenhal, 1827) from Corsica was synonymized by GUSAROV (1994: 434). It is true that *S. asiaticus* resembles the Corsican population of *S. laevigatus* in the general appearance, but it cannot be confused according to the male and female genital characters and the Central Asian distribution.

Scopaeus kabakovi Gusarov
(Figs. 41, 51, 62)

Scopaeus (Hyposcopaeus) kabakovi GUSAROV, 1994: 437.
Scopaeus kabakovi; FRISCH 1999a: 49.

New records

Afghanistan: Kabol: Djaouz (Qorogh Mts.) [34°27′N 68°55′E], 11.VII.1962, leg. LINDBERG. — **Pakistan**: Gilgit-Baltistan, Darel Valley: Jatschot [35°42′N 73°38′E], leg. PIFFL. Khyber Pakhtoon (= Northwest Frontier): Swat Valley: Malam Jabba [34°49′N 72°35′E], 2300–2400 m, 9.V.1983, leg. BESUCHET & LÖBL (MHNG, MNHB); Naran [34°54′N 73°39′], 2600 m, 1.VI.1983, leg. BESUCHET & LÖBL (MHNG, MNHB).

Diagnostic characters

Scopaeus kabakovi was redescribed by FRISCH (1999a: 49–52). While the aedeagus was already illustrated several times (GUSAROV 1994: figs. 16, 17; FRISCH 1999a: figs. 4–6, 2008: figs. 7–9), the female genital characters (Fig. 51) are here presented for the first time based on a specimen from the Swat Valley, Pakistan (MNHB), the identification of which is confirmed by male specimens from the same sample: Lateral gonocoxal plates slender, about four times as long as wide (Fig. 41). Bursa very large, about 0.8 times as long as lateral gonocoxal plates, from long triangular sclerotized posterior end evenly widened towards isosceles-shaped anterior third (Fig. 51). Sclerotized portion of spermathecal duct very long and winding, about 12 times as long as sperm pump (Fig. 51).

Distribution

Scopaeus kabakovi Gusarov is distributed south of the highest chains of the Hindukush and Karakoram (Fig. 62) and hitherto recorded from Afghanistan (Nuristan: Čapadara, GUSAROV 1994: 437) and Pakistan (Gilgit-Baltistan: Haramosh Range, FRISCH 2008: 283; Khyber Pakhtoon: Swat Valley, FRISCH 1999a: 51). The new record for the Kabol Province, Afghanistan, extends the known distribution of *S. kabakovi* about 200 km to the southwest (Fig. 62).

Both the ectomorphological appearance and the primary genital characters of a female *Scopaeus* (Fig. 52) from the Pir Panjal Range in the Indian district Jammu & Kashmir (NW Poonch: Loran, 17.VIII.2010, leg. REUTER) resemble those of *S. kabakovi* (Fig. 51). Because the female genitals of closely related *Scopaeus* species often do not hold species diagnostic characters, it is, however, doubtful if this specimen, collected far southeast of the known area of distribution of *S. kabakovi* (FRISCH 2008: fig. 17), is conspecific. Nevertheless, it represents the first record of the *S. obscuripes* group in the Pir Panchal Range.

Scopaeus obscuripes Cameron
(Fig. 62)

Scopaeus obscuripes CAMERON, 1931: 173.
Scopaeus obscuripes; FRISCH 1999a: 48.

Distribution

Scopaeus obscuripes Cameron was described from a male and a female (BMNH) collected in two different localities in the Siwalik Range, a part of the Lesser Himalayas in Northwest India. Years ago, I designated the male specimen, which originates from the district of Chakrata (30°41′N 77°52′E), Uttarakhand, as the lectotype (FRISCH 1999a: 48). The exact type locality Jadi Gad, however, I could not identify. The female paralectotype was collected in the Shimla Hills (Fagu, 31°02′N 77°17′E), Himachal Pradesh, approximately 100 km northwest of the type locality. Though it does not differ from the lectotype in ectomorphological characters and shows the sclerotized posterior end of the bursa of the *S. obscuripes* group, it is uncertain if this female is conspecific to the lectotype

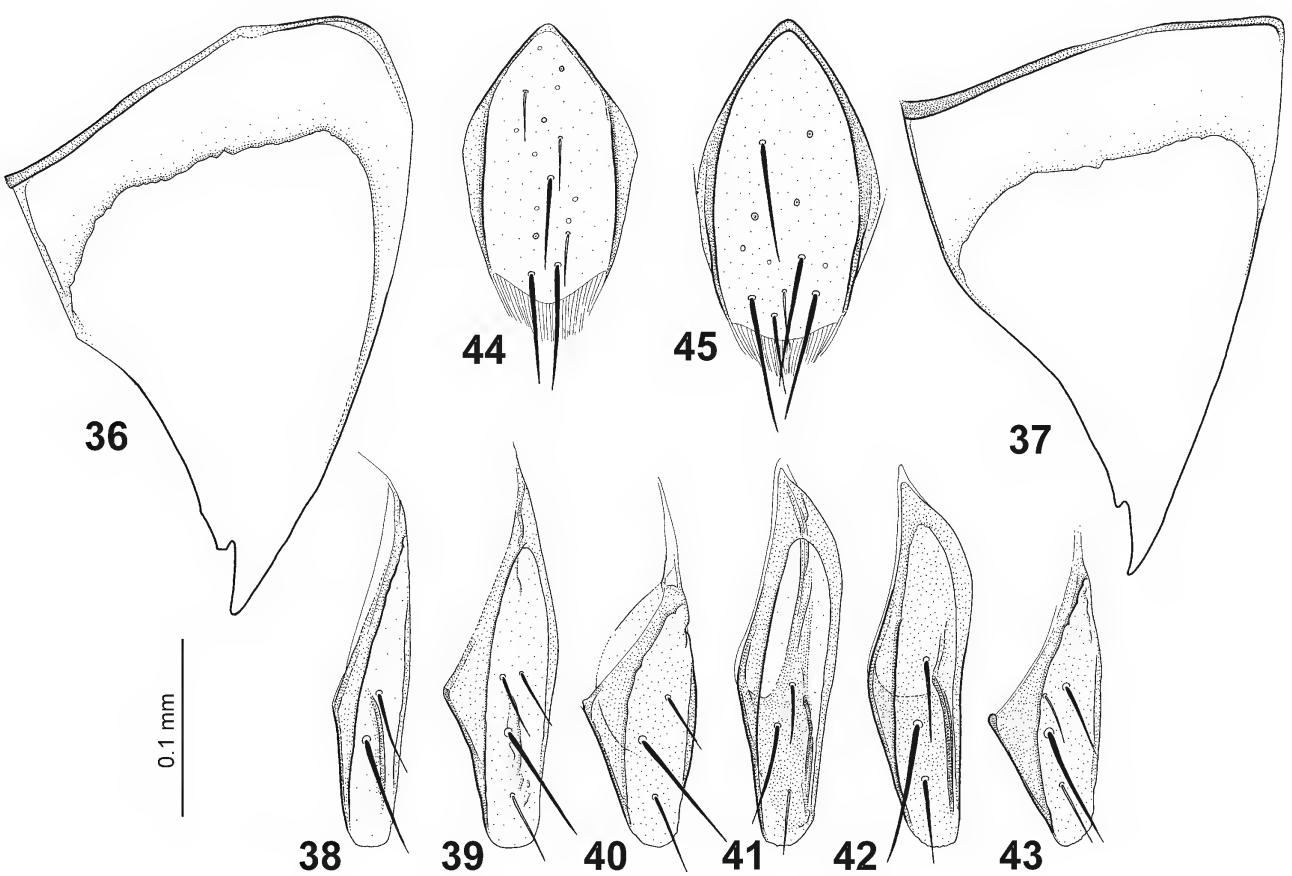
considering the endemic distribution of many members of that species group. In the same publication, I recorded *S. obscuripes* from Gulmarg (34°02′N 74°22′E) in the Pir Panjal Range, Jammu and Kashmir, based on two females (BMNH), which, when I recently examined them again, turned out to be members of the Central Asian *S. similis* species group (Frisch 2014). Consequently, the type locality Jadi Gad in the Chakrata District is the only doubtless locality of *S. obscuripes* known so far (Fig. 62).

4.3 *Scopaeus likovskyi* lineage
(Figs. 3–8, 12–29, 31–35, 36, 38–40, 43, 44, 53–57, 63)

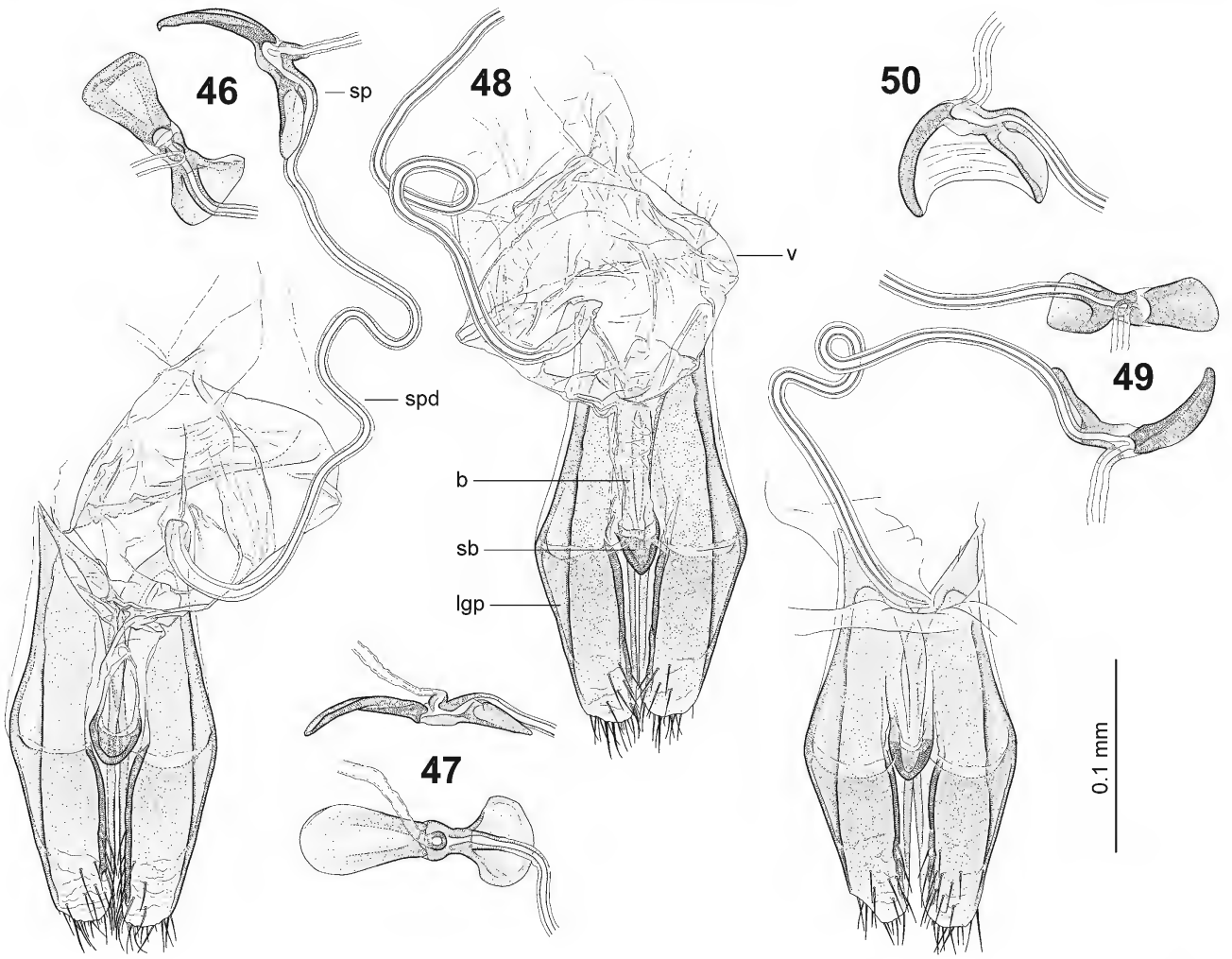
Within the *S. obscuripes* species group, the following six species represent a distinct phylogenetic clade, here named the *S. likovskyi* lineage. Since their ectomorphological characters are very similar and moreover overlap due to the great intraspecific variability of coloration, microreticulation, and body proportions (Figs. 3–8), the included species are briefly diagnosed using their primary and secondary sexual characters only. In the following diagnosis of the *S. likovskyi* lineage I do not repeat the general characters of the *S. obscuripes* species group.

Diagnosis of the *Scopaeus likovskyi* lineage

Total length 3.1–3.9 (Ø 3.6) mm, forebody length 1.8–2.1 (Ø 1.9) mm. Primary body colour (Figs. 3–8) medium or reddish brown to blackish brown, rarely black or orange brown; elytra usually lighter posteriorly to variable extent, with lighter brown posterior margin only up to entirely lighter except for dark scutellar triangle; abdomen darker than forebody except for posterior end, dark brown to black; antennae, maxillary palpi except for usually darker penultimate segment, and legs medium brown. Microreticulation of forebody surface very variable, absent, weak, or distinct, forebody thus shiny to dull. Head 1.06–1.17 (Ø 1.12) times as long as wide, across tempora 1.01–1.08



Figs. 36–45. *Scopaeus obscuripes* species group, genital sclerites of females, laterotergite IX (36, 37), lateral gonocoxal plate (38–43), tergite X (44, 45). – **37**, **42**, **45**. *S. asiaticus* Bernhauer (Tadzhikistan, Varzob: Adjuk Cleft). **36**, **38**, **44**. *S. likovskyi* Boháč (Kyrgyzstan, Batken: Teo-Jailoo Valley). **39**. *S. milkoi* n. sp. (paratype; Kyrgyzstan, Chui, W Yurevka: Karandolot). **40**. *S. moriturus* n. sp. (paratype; Kyrgyzstan, Batken, Isfairam-Say). **41**. *S. kabakovi* Gusarov (Afghanistan, Kabol). **43**. *S. apiculatus* n. sp. (paratype; Kyrgyzstan, Jalal-Abad: Kelbel-Pass).



Figs. 46–50. *Scopaeus asiaticus* lineage, genital characters of females in dorsal view. – **46–48**. *S. asiaticus* Bernhauer (Tadzhikistan, Varzob: Adjuk Cleft). **49**, **50**. *S.* cf. *asiaticus* (paralectotype of *S. asiaticus*; Turkmenistan, Kizyl-Arvat). – Abbreviations: b = bursa; lgp = lateral gonocoxal plate; sb = sclerotized end of bursa; sp = sperm pump; spd = sclerotized portion of spermathecal duct; v = vagina.

(Ø 1.04) times as wide as across eyes, usually distinctly trapezoidal. Eyes small to medium sized, 0.44–0.60 (Ø 0.5) times as long as tempora. Elytra comparatively short, 0.90–1.08 (Ø 0.96) times as long as pronotum. Lateral denticles of labrum somewhat shorter than or as long as median denticles. Antennal segments comparatively slender; segment 8 1.1–1.2 (Ø 1.2) times, segment 9 1.0–1.1 (Ø 1.1) times, and segment 10 1.0–1.1 (Ø 1.0) times as long as wide. Protarsomeres strongly transverse, in both sexes about three times as wide as long. Mesotibia very slender, 6.0–7.3 (Ø 6.6) times as long as wide.

Male: Abdominal sternite VIII in about posterior fourth to fifth triangularly emarginate and with round or slightly elongate, asetose impression close to posterior margin on either side of imaginary longitudinal midline, with or without medio-posterior field of dark, long, latero-posteriad pointing setae (Figs. 31–35). Aedeagus (Figs. 12–29) slender in dorsal and ventral view; apical lobes very slender, about as long as phallobasis, in distal half curved dorsad and gradually tapered towards thin, acute ends; dorsal lobe about half as long as apical lobes, in lateral view often widened in middle or towards apex, in dorsal and ventral view narrow with emarginate apex at either side extended to sharp, disto-ventrad orientated tooth visible in lateral view; flagellum about as long as dorsal lobe, straight or somewhat curved ventrad with strongly dorsad curved apex visible in apical emargination of dorsal lobe.

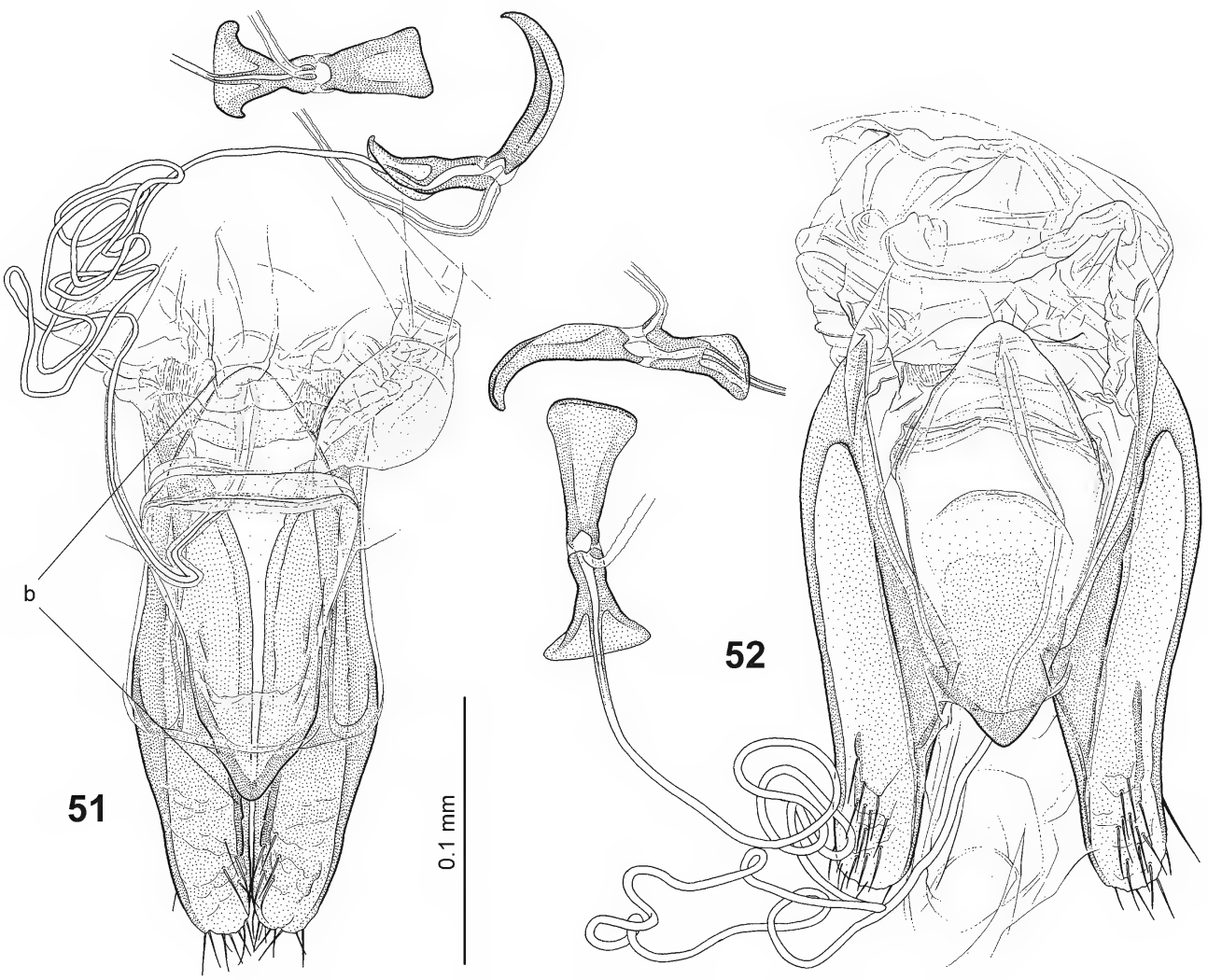
Female: Lateral gonocoxal plates slender to stout, about 2.5–5.0 times as long as wide (Figs. 38–40, 43). Bursa large, about 0.75–1.00 times as long as lateral gonocoxal

plates (Figs. 53–57). Sclerotized portion of spermathecal duct thin, in a few measured specimens 5.6–6.9 times as long as sperm pump (Figs. 53–57).

Distribution and bionomics

The scattered finds from the western Tienshan and the western Alai Mountains south to the northern Hindukush suggest a wide distribution of the *Scopaeus likovskyi* lineage in the Central Asian mountains (Fig. 63). The lack of records east of a line from the northern Tien Shan east of Bishkek (42°44′N 74°55′E), the Arslanbob National Park in the southern Tien Shan (41°19′N 72°57′E), the Turkestan Mountain Ridge at 40°04′N 72°07′E, and the Badakhshan Province in Afghanistan at 36°17′N 70°33′E must be looked upon as an artefact due to the paucity of collecting activity in eastern Central Asia.

Members of the *S. likovskyi* lineage preferably dwell in damp, fine soil, frequently loess, of steep banks of small brooks, even rivulets, where they can reach high abundances compared to riparian habitats along larger brooks and streams, where I happened on single specimens only. They strictly avoid the wide, sterile gravel banks of the large mountain streams, which are inhabited by the members of the *S. similis* group, which however occur on the banks of small running waters as well (Frisch 2014: 219). Unlike other *Scopaeus*, the species of the *S. likovskyi* lineage are moreover adapted to ephemeral waters. I repeatedly collected them under stones and in relatively dry, sandy soil of the banks of dried out brooks and rivulets. Due to this tolerance to dryer habitats, members of the *S. likovskyi* lineage also inhabit brooks within steppe-like environments. They obviously prefer lower eleva-



Figs. 51, 52. *Scopaeus asiaticus* lineage, genital characters of females. – **51**. *S. kabakovi* Gusarov (Pakistan, Swat Valley), dorsal view. **52**. *S.* cf. *kabakovi* (India, Pir Panjal Range: NW Punch), ventral view with lateral gonocoxal plates folded laterally. – Abbreviation: b = bursa.

tions from 600 m to 1500 m, but the vertical distribution extends up to 3500 m in the Hindukush.

Scopaeus likovskyi Boháč
(Figs. 3, 12–14, 31, 36, 38, 44, 53, 54, 63)

Scopaeus (Asiascopaeus) likovskyi Boháč, 1988: 441.
Scopaeus likovskyi; Frisch 1999a: 52.

Type material

Holotype ♂: Tadzhikistan, Nohijahoi tobei Dschumhurij, N Dushanbe: Takob, IV.1983, 3000 m, leg. Boháč (J. Boháč Private Collection, České Budějovice); examined.

Additional material examined (184 specimens)

Afghanistan: Badakhshan, Sarekanda Mts. [36°17′27″N 70°33′10″E], 3500 m, 26.VII.1953, leg. Klapperich (NHMW). — **Kyrgyzstan**: Batken: E Sovetsky (Katrang-Too Mts.) (40°07′19″N 71°22′59″E), 1410 m, 20.VI.2012, leg. Frisch (IBPB, MNHB); Isfana – Isfara: SWW Ozgurush (Lyailek River, Turkestan Mts.) (39°44′25″N 69°59′53″E), 1520 m, 22.VI.2012, leg. Frisch; Isfana – Isfara: SWW Ozgurush (tributary of Lyailek River, Turkestan Mts.) (39°44′26″N 70°00′28″E), 1560 m, 23.VI.2012, leg. Frisch; Isfana – Isfara: Korgon (Lyailek River) (39°54′15″N 69°54′34″E), 1020 m, 23.VI.2012, leg. Frisch; SW Isfana: Dinau (Turkestan Mts.) (39°41′59″N 69°22′30″E), 1770 m, 24.VI.2012, leg. Frisch; NE Isfana, N Suljukta: Bulak-Bashi (39°58′15″N 69°34′37″E), 980 m, 26.VI.2012, leg. Frisch; S Ay-Kol: Teo-Jailoo Valley (Tegir-Malik River) (39°43′09″N

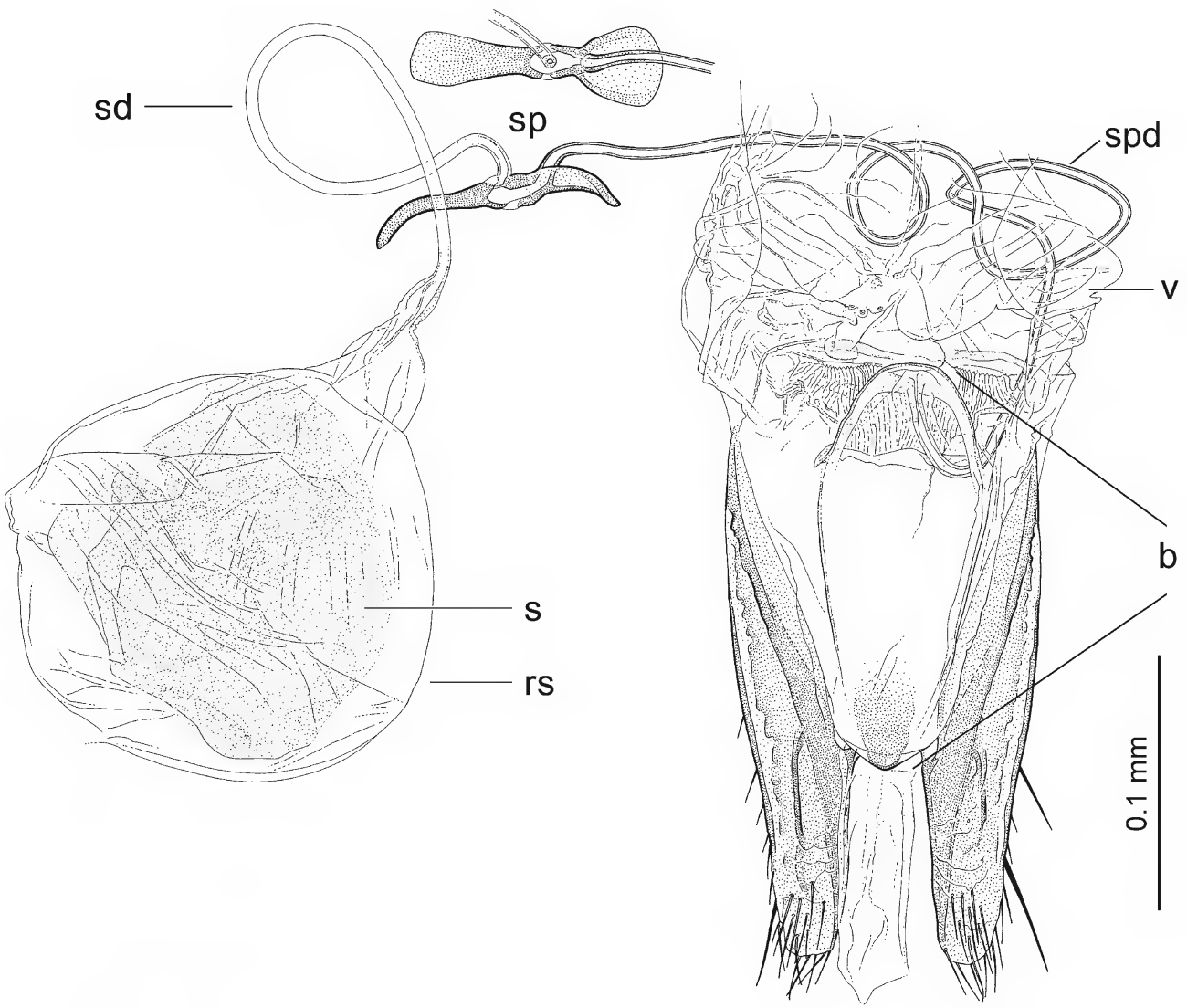


Fig. 53. *Scopaeus likovskyi* lineage, genital characters of *S. likovskyi* Boháč, female (Kyrgyzstan, Batken: Teo-Jailoo Valley) in ventral view with lateral gonocoxal plates folded laterally. – Abbreviations: b = bursa; rs = receptaculum seminis; s = sperm; sd = spermathecal duct; sp = sperm pump; spd = sclerotized portion of spermathecal duct; v = vagina.

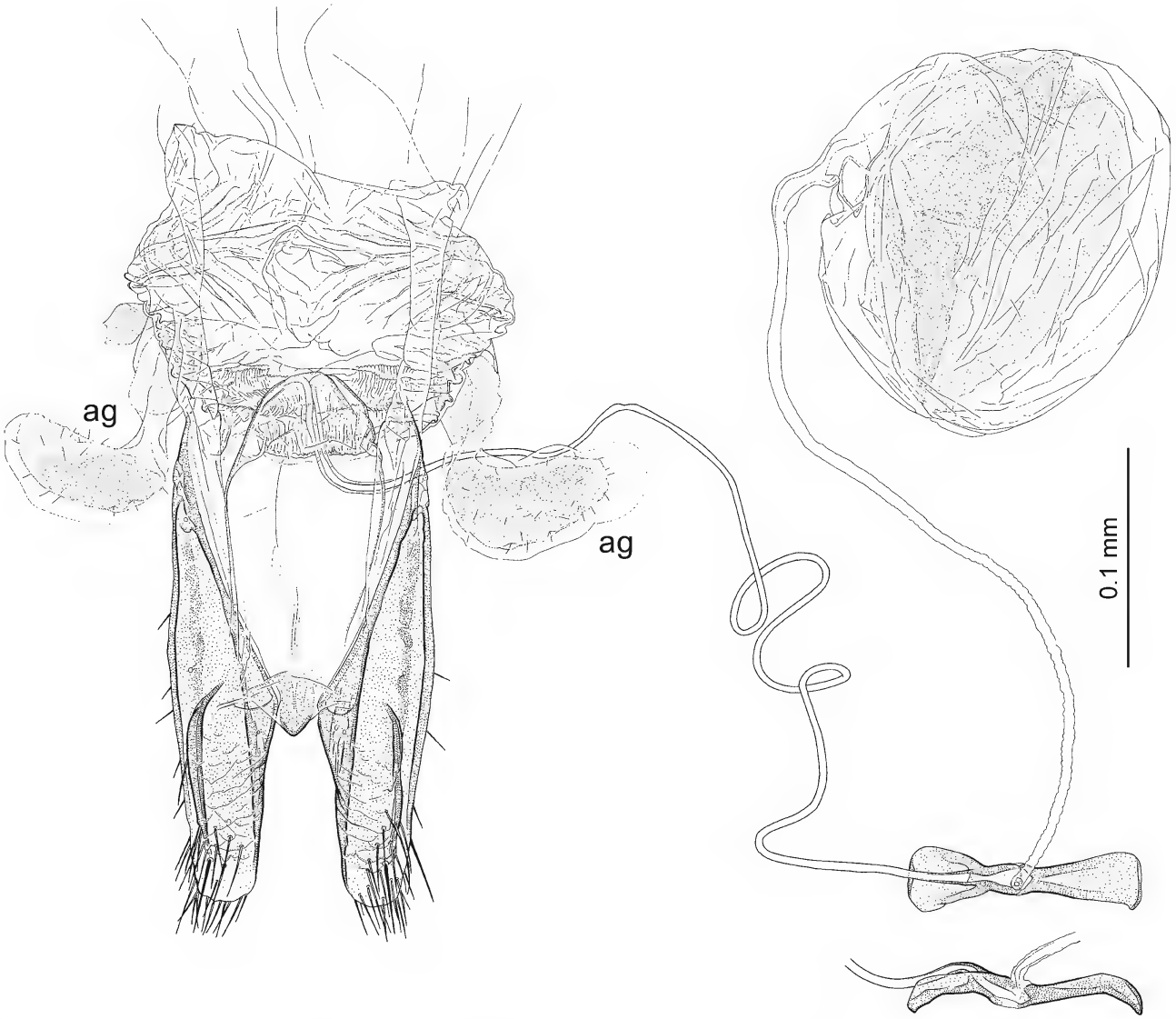


Fig. 54. *Scopaeus likovskyi* lineage, genital characters of *S. likovskyi* Boháč, female (Kyrgyzstan, Batken: Teo-Jailoo Valley) in ventral view with lateral gonocoxal plates folded laterally (specimen different from Fig. 53 showing variability of genital characters). – Abbreviation: ag = accessory gland.

69°41′59″E), 2100 m, 28.VI.2012, leg. Frisch (IBPB, MNHB). — **Uzbekistan**: Kashkadarya: Ishkent (38°50′48″N 66°57′38″E), 1200–1300 m, 27.III.1942, leg. Arnoldi (MZMC); Samarkand [39°39′10″N 67°06′03″E], 28.V.1965 (ZICP). Tashkent, 1200–1300 m, 27.III.1942, leg. Arnoldi. — **Tadzhikistan**: Nohijahoi tobei Dschumhurij: 48 km N Dushanbe: Khoja-Obigarm [Choja-Obigarm] [38°53′50″N 68°47′15″E], 1900 m, 3.–4. VII.2012, leg. Barševskis (ASCD).

Diagnosis

Male: Abdominal sternite VIII triangularly emarginate in posterior fourth and with round, asetose posterior-lateral impression on either side of imaginary midline (Fig. 31). Apical lobes of aedeagus (Figs. 12–14) extraordinarily thin, moderately curved dorsad in lateral view, in dorsal and ventral view tweezers-shaped, in about proximal half notably concave laterally, almost attenuate; dorsal lobe, in lateral view, considerably widened except for acute apex, thus notably projecting from ventral margin of apical lobes; end of flagellum evenly curved dorsad.

Female: Lateral gonocoxal plates slender, about five times as long as wide (Figs. 38, 53, 54). Bursa slender, about 2.2–2.4 times as long as wide, with notably convex lateral margins widened anteriad; sclerotized posterior end narrow, lateral gonocoxal plates thus close to each other (Figs. 53, 54).

Fig. 55. *Scopaeus likovskyi* lineage, genital characters of *S. milkoi* n. sp., female (paratype; Kyrgyzstan, Chui, W Yurevka: Karandolot) in ventral view with lateral gonocoxal plates folded laterally.

Distribution

Scopaeus likovskyi Boháč is distributed in the west of the Central Asian mountains and the most widespread species of the *S. likovskyi* lineage (Fig. 63). It is known from the western foothills of the Tien Shan at 41°20′N 69°48′E and many localities in the western Alai Mountains from the western foothills at about 67°E eastwards to the Katrang-Too Range (40°07′N 71°22′E), a northern foothill south of the Fergana Basin. The find in southern Badakhshan, Afghanistan, at 36°17′N 70°33′E (Frisch 2008: 283) far south of the localities in the Alai Mountains points to a wide distribution in Southwest Tadzhikistan and the northern Hindukush Mountains. Eastward, *S. likovskyi* is replaced by *S. chatkalensis* n. sp. in the western Tien Shan and *S. moriturus* n. sp. in the northern Alai Mountains (Fig. 63). Due to finds of these allopatric relatives only about 60 km east of the easternmost localities of *S. likovskyi*, the eastern limit of distribution of *S. likovskyi* in the northern part of its areal is known quite precisely. The species is here for the first time recorded for Kyrgyzstan.

Scopaeus milkoi **n. sp.**
(Figs. 4, 15–17, 32, 39, 55, 63)

Type material (all from Kyrgyzstan, Chui)

Holotype ♂: SE Bishkek, 11 km W Yurevka: Karandolot (42°44′24″N 74°55′20″E), 1100 m, 4.VII.2011, leg. Frisch.

Paratypes (6 specimens): 3 ♀♀, same data as holotype; 3 ♀♀, same locality, but (42°44′21″N 74°55′49″E), 1120 m, 21.VI.2013, leg. Frisch (IBPB, MNHB).

Etymology

I dedicate this new species to my colleague Dmitry Milko, entomologist at the Institute of Biology and Pedology of the Academy of Sciences of the Republic of Kyrgyzstan in Bishkek, who took me to the type locality during a joint expedition to the Tien Shan in 2011 and kindly organized a second visit of that place two years later.

Diagnosis

Similar to *Scopaeus likovskyi* Boháč, from which it differs as follows.

Male: Posterior triangular emargination of abdominal sternite VIII somewhat wider (Fig. 32). Apical lobes of aedeagus (Figs. 15–17) in lateral view narrower and parallel in proximal portion of distal half (distal of apex of dorsal lobe) and with somewhat stronger dorsad curved end, in dorsal and ventral view in about proximal third much wider and notably convex laterally; dorsal lobe in lateral view much more slender, less projecting from apical lobes ventrally, and with less ventrad pointing apex; outermost end of flagellum only less evenly, but almost angled curved dorsad.

Female: Lateral gonocoxal plates somewhat broader, about four times as long as wide (Figs. 39, 55). Bursa subparallel with much broader, almost semicircular sclerotized posterior end, lateral gonocoxal plates thus widely separate; membrane posterior of bursa with field of minute setules (arrow in Fig. 55).

Distribution

The distribution of *Scopaeus milkoi* n. sp. is unknown. The species is hitherto known from the type locality approximately 40 km southeast of Bishkek in the northern foothills of the Tien Shan only.

Scopaeus apiculatus **n. sp.**
(Figs. 5, 18–20, 33, 43, 56, 63)

Type material (all from Kyrgyzstan, Jalal-Abad)

Holotype ♂: Sary-Chelek village (41°42′02″N 71°58′53″E), 1020 m, 5.VI.2014, leg. Frisch.

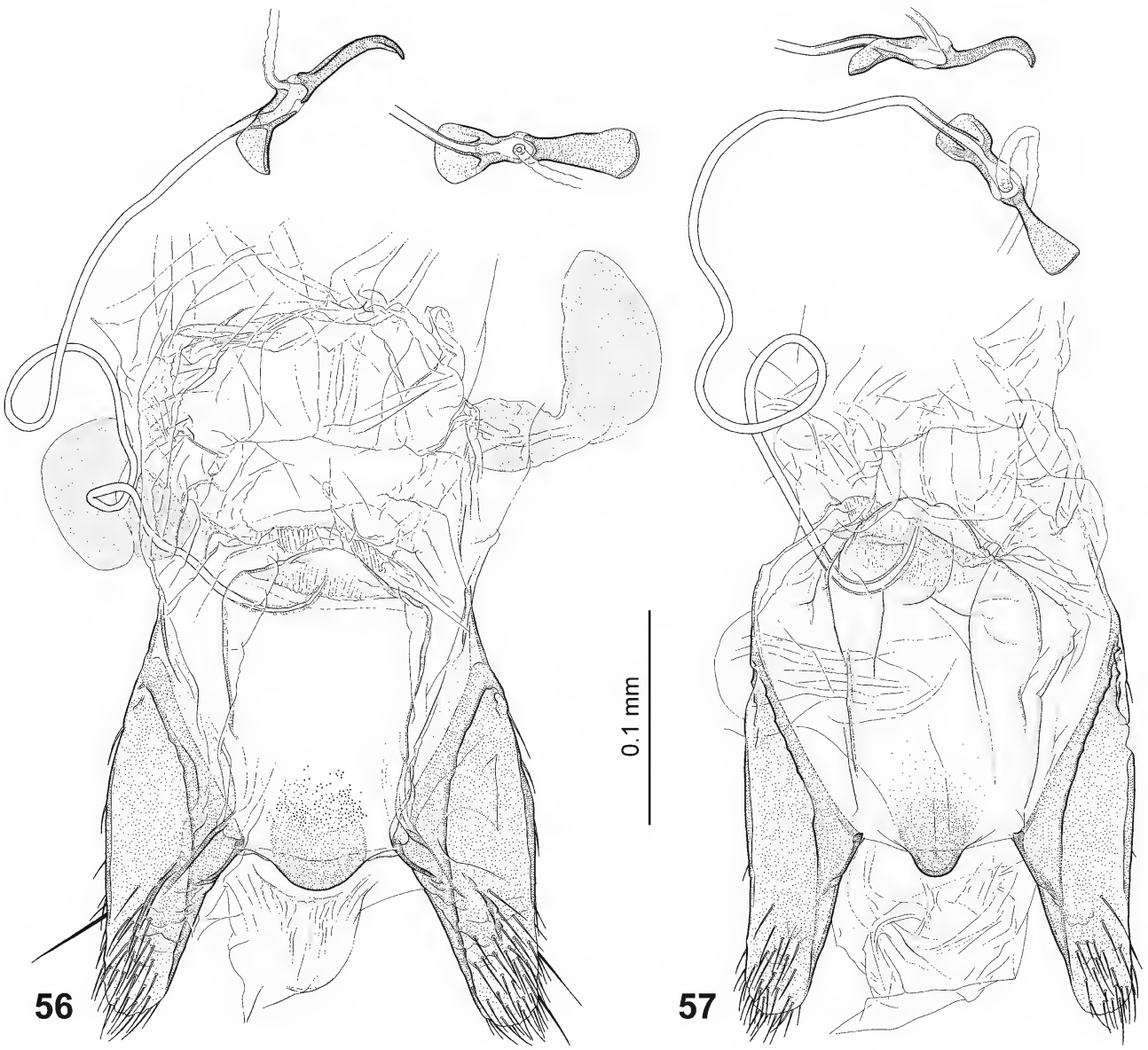
Paratypes (209 specimens): 35 ♂♂, 71 ♀♀, same data as holotype (MNHB, SMNS); 3 ♂♂, 6 ♀♀, Sary-Chelek NR (41°51′30″N 71°56′17″E), 1530 m, 6.VI.2014, leg. Frisch; 1 ♂, 2 ♀♀, NE Kerben: Jerge-Tal (41°35′01″N 71°51′20″E), 1220 m, 8.VI.2014, leg. Frisch; 11 ♂♂, 9 ♀♀, NNW Kerben: Kashka-Suu (41°41′00″N 71°37′56″E), 1660 m, 8.VI.2014, leg. Frisch; 16 ♂♂, 13 ♀♀, preceding locality, but (41°39′02″N 71°38′18″E), 1680 m, 10.VI.2014, leg. Frisch; 1 ♀, SE Toktogul (41°51′41″N 73°02′23″E), 1050 m, 29.V.2014, leg. Frisch; 2 ♀♀, Toktogul – Kara-Kul: Kekbel Pass (41°42′36″N 72°55′29″E), 1420 m, 2.VI.2012, leg. Frisch; 1 ♀, preceding locality, 11.VI.2013, leg. Frisch (MNHB); 1 ♀, Toktogul – Kara-Kul: Kekbel (41°42′09″N 72°55′13″E), 1200 m, 20.VI.2013, leg. Frisch; 1 ♀, preceding locality, 30.V.2014, leg. Frisch; 3 ♂♂, 8 ♀♀, preceding locality, but (41°41′34″N 72°53′43″E), 1160 m, 30.V.2014, leg. Frisch; 1 ♂, 1 ♀, Kara-Kul – Tash-Kumyr (41°29′24″N 72°19′21″E), 640 m, 31.V.2014, leg. Frisch; 3 ♂♂, 2 ♀♀, Tash-Kumyr (E of Naryn River) (41°18′52″N 72°12′17″E), 600 m, 3.VI.2014, leg. Frisch; 1 ♂, NNW Tash-Kumyr, Čat – Jangi-Jol: Tegene (41°31′07″N 72°12′54″E), 950 m, 5.VI.2014, leg. Frisch; 14 ♂♂, 2 ♀♀, Tash-Kumyr – Alcha (41°26′52″N 72°12′46″E), 770 m, 4.VI.2014, leg. Frisch.

Etymology

The epithet "*apiculatus*" (Latin, adjective: "finely apiculate") refers to the needle-thin apical third of the apical lobes of the aedeagus of the new species.

Diagnosis

Male: Abdominal sternite VIII with triangular emargination in about posterior fourth, two latero-posterior impressions and medio-posterior field of dark, long, latero-posteriad orientated setae (Fig. 33). Apical lobes of aedeagus (Figs. 18–20) in posterior two-thirds approximately parallel except for dorsad curved end of ventral margin and ending in right-angled tip because of ventrally extremely narrowed, thin, needle-shaped distal third of apical lobes; in ventral and dorsal view, apical lobes sha-



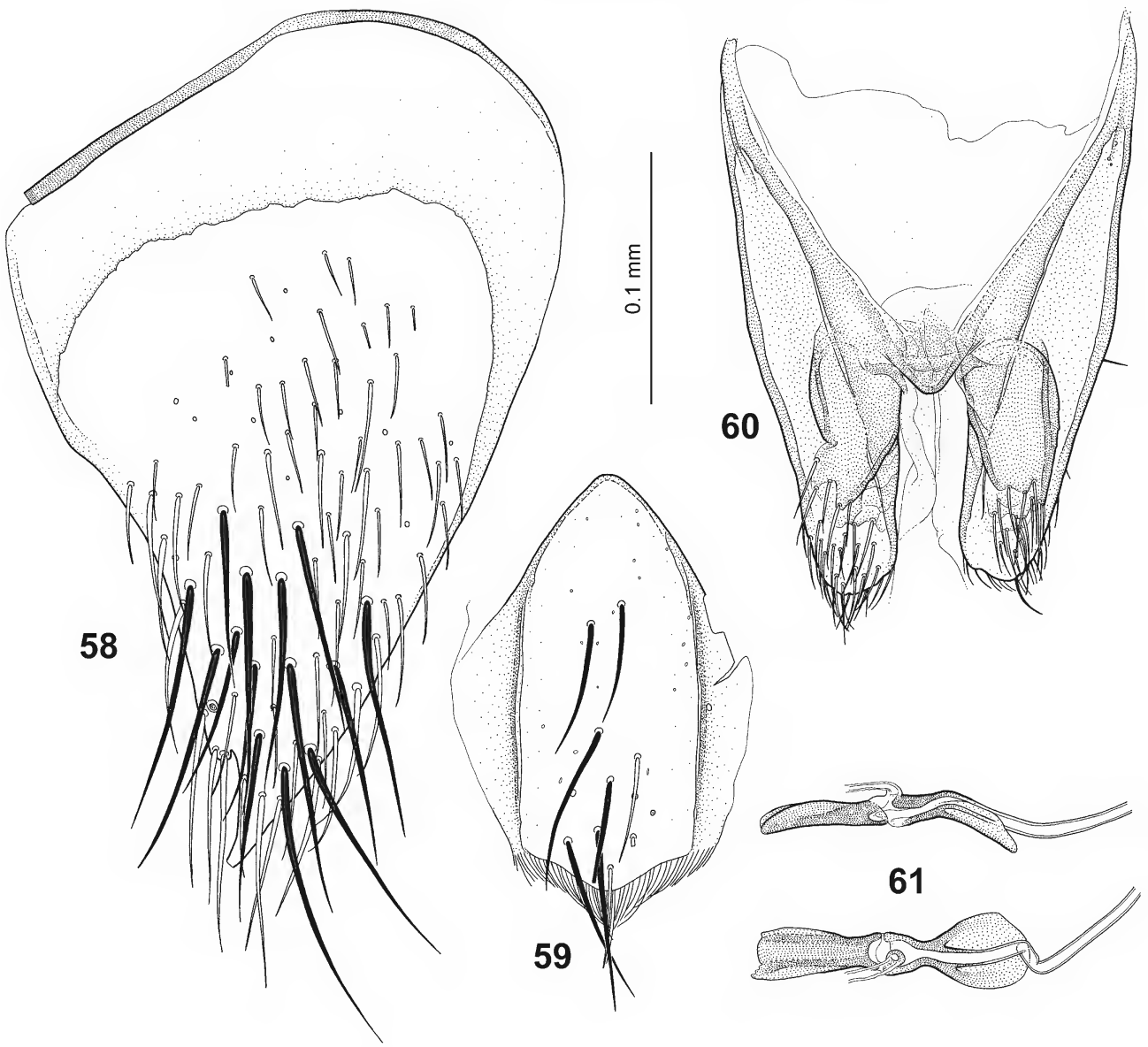
Figs. 56, 57. *Scopaeus likovskyi* lineage, genital characters of females in ventral view with lateral gonocoxal plates folded laterally. – **56**. *S. apiculatus* n. sp. (paratype; Kyrgyzstan, Jalal-Abad, Kekbel-Pass). **57**. *S. moriturus* n. sp. (paratype; Kyrgyzstan, Batken, Isfairam-Say).

ped like end of arrow, moderately widened distad in proximal third, V-shaped in median third, and evenly tapered towards acute apices in distal third; dorsal lobe long, reaching end of median third of apical lobes, in lateral view with short, acute, somewhat ventrad curved apex; flagellum shorter than dorsal lobe, straight with outermost end only curved dorsad.

Female: Lateral gonocoxal plates broad, about 2.5 times as long as wide (Figs. 43, 56). Bursa broad with subparallel lateral margins, about 1.8 times as long as wide, lateral gonocoxal plates thus widely separate; sclerotized posterior end round, usually broad (Fig. 56), but sometimes narrower as in Fig. 57.

Distribution

Scopaeus apiculatus n. sp. is endemic to a small areal in the southwestern Tien Shan, Kyrgyzstan, roughly delimited to the west by the Chatkal Mountain Range and to the east by the Baubashata Range. East and west of these mountain barriers, the species is replaced by allopatric relatives (Fig. 63). *Scopaeus apiculatus* was found from Kashka-Suu (41°41′N 71°37′E) eastwards to the Naryn



Figs. 58–61. *Scopaeus caspius* n. sp. (holotype), genital characters of female. – **58**. Laterotergite IX. **59**. Tergite X. **60**. Lateral gonocoxal plates and bursa in ventral view with lateral gonocoxal plates folded laterally. **61**. Sperm pump.

River from Toktogul (41°51′N 73°02′E) south to Tash-Kumyr (41°18′N 72°12′E). The northern limit of distribution is unknown.

Scopaeus moriturus **n. sp.**
(Figs. 6, 21–23, 34, 40, 57, 63)

Type material (all from Kyrgyzstan, Batken)

Holotype ♂: W Majdan: Tamasha-Say (40°03′55″N 72°03′17″E), 1460 m, 15.VI.2013, leg. Frisch.

Paratypes (149 specimens): 24 ♂♂, 43 ♀♀, same data as holotype (IBPB, MNHB); 4 ♂♂, 3 ♀♀, Majdan: Shambesai Valley (40°04′43″N 72°04′10″E), 1360 m, 13.VI.2013, leg. Frisch; 2 ♂♂, 3 ♀♀, Majdan: Shambesai Valley (40°04′44″N 72°04′09″E), 1370 m, 17.VI.2012, leg. Frisch; 25 ♂♂, 38 ♀♀, 3km NE Majdan: Pum (40°04′39″N 72°07′20″E), 1400 m, 17.VI.2013, leg. Frisch (MNHB, SMNS); 1 ♀, S Majdan, W Karaul: Bant Valley (40°00′30″N 72°02′46″E), 1460 m, 16.VI.2013, leg. Frisch; 1 ♀, W Majdan: Yavan-Say (40°02′06″N 72°04′59″E), 1350 m, 18.VI.2013, leg. Frisch; 1 ♀, N Karadzhigach: Valakish (40°10′34″N 72°06′07″E), 1450 m, 14.VI.2013, leg. Frisch; 4 ♀♀, W Karadzhigach: Karadzhigach-Say (40°06′59″N 72°02′24″E), 1560 m, 13.VI.2013, leg. Frisch.

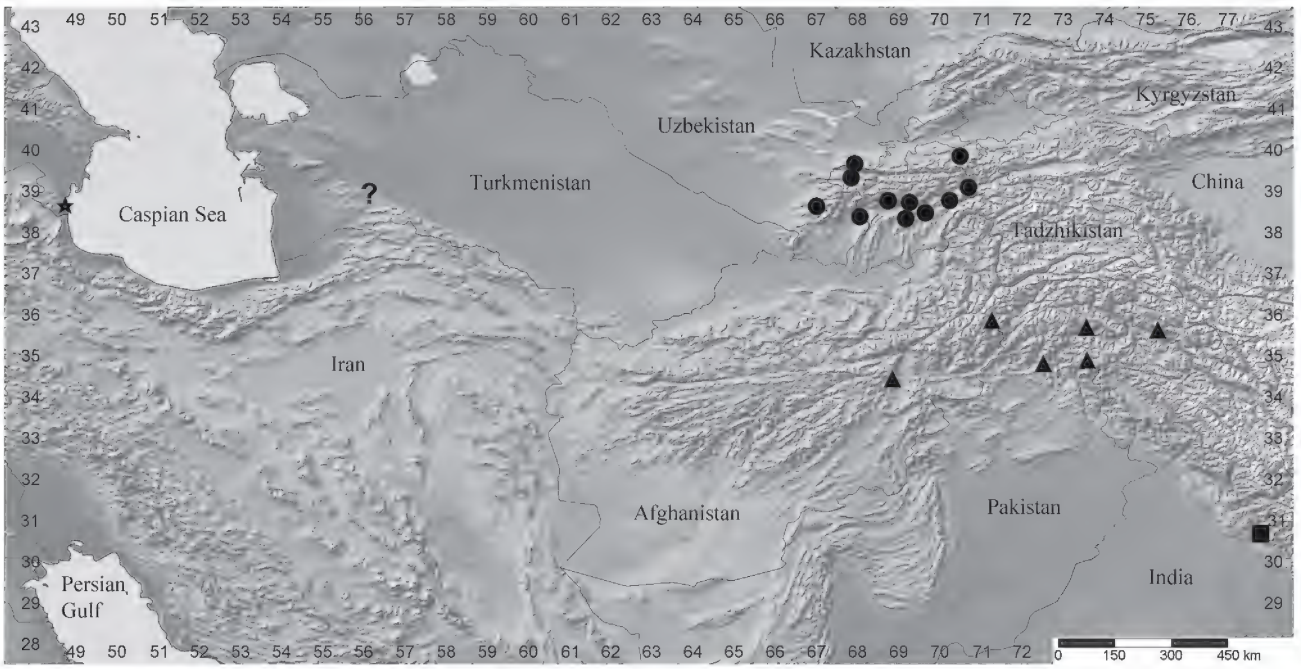


Fig. 62. Distribution of *Scopaeus caspius* n. sp. and the *S. asiaticus* lineage in the Middle East and Central Asia. – ★ *S. caspius* n. sp. ● *S. asiaticus*. **?** dubious locality of paralectotypes of *S. asiaticus*. ▲ *S. kabakovi*. ■ *S. obscuripes*.

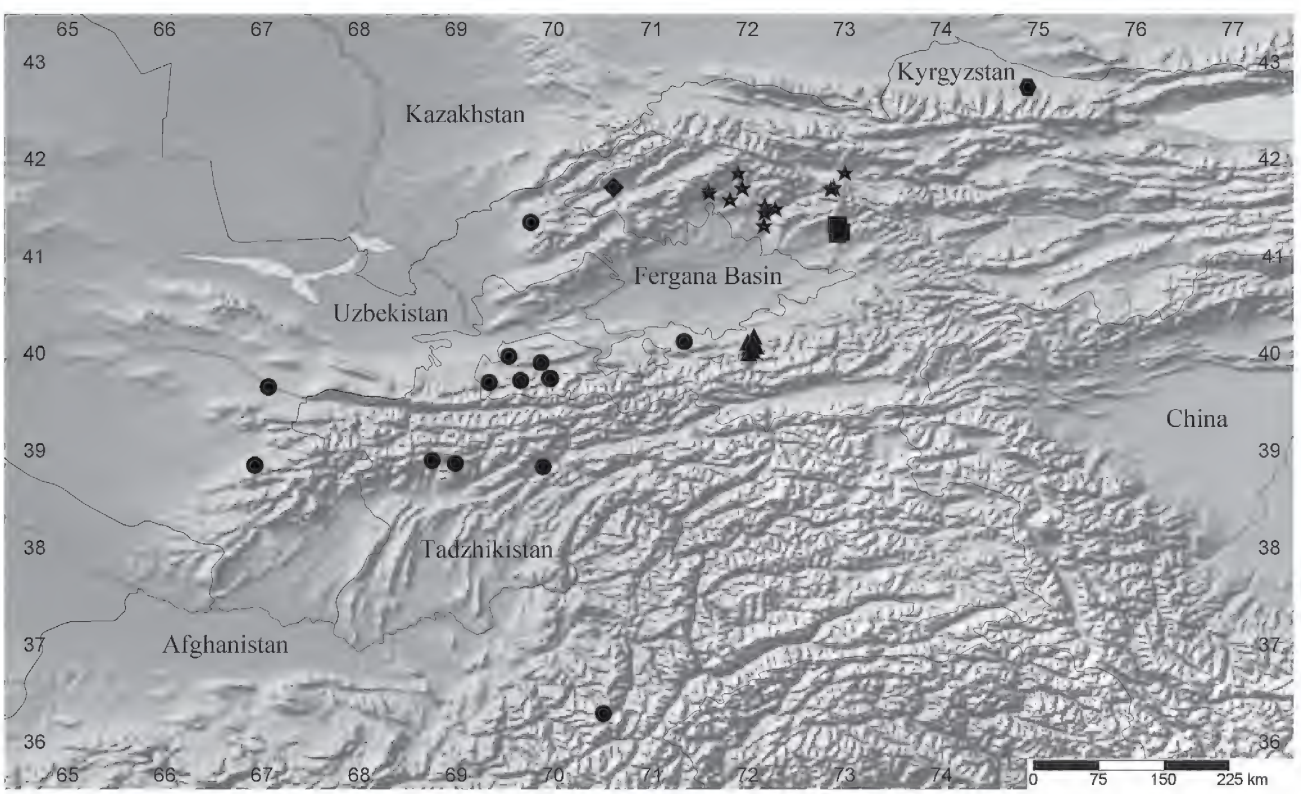


Fig. 63. Distribution of the *S. likovskyi* lineage in Central Asia. – ● *S. likovskyi*. ⬢ *S. milkoi* n. sp. ★ *S. apiculatus* n. sp. ▲ *S. morit-urus* n. sp. ■ *S. schawalleri* n. sp. ◆ *S. chatkalensis* n. sp.

Etymology

The epithet "*moriturus*" (Latin, adjective: "dedicated to death") points to the planned gold production with cyanide in the Shambesai Valley, a sidevalley of Isfairam-Say, where I collected the new species for the first time.

Diagnosis

Similar to *Scopaeus apiculatus* n. sp., from which it differs as follows:

Male: Apical lobes of aedeagus (Figs. 21–23) in lateral view somewhat widened in proximal half, in distal half strongly curved towards evenly tapered distal third, in dorsal and ventral view V-shaped median third notably broader; dorsal lobe somewhat widened in lateral view; flagellum moderately curved ventrad with outermost end strongly bent dorsad.

Female: Width of round sclerotized posterior end of bursa variable, usually narrow (Fig. 57), often as wide as in *S. apiculatus* (Fig. 56).

Distribution

Scopaeus moriturus n. sp. is hitherto known only from the Isfairam-Say River System in the eastern Turkestan Mountain Range, the northernmost chain of the Alai Mountains south of the Fergana Basin (Fig. 63). Towards the west, it is replaced by the allopatric *S. likovskyi* Boháč, which was found only about 60 km further west. While the Fergana Basin probably delimits the areal of *S. moriturus* towards the north, the southern and eastern limits of distribution are however unknown.

Scopaeus schawalleri **n. sp.**
(Figs. 7, 24–26, 63)

Type material (all from Kyrgyzstan, Jalal-Abad)

Holotype ♂: SE Arslanbob: Gumkana (Arslanbob NR) (41°19′27″N 72°57′07″E), 1330 m, 1.VI.2014, leg. Frisch.

Paratypes (17 specimens): 3♂♂, 7♀♀, same data as holotype (IBPB, MNHB); 1♂, 2♀♀, Pravda (Karaungur Valley at Arslanbob NR) (41°13′41″N 72°57′57″E), 1010 m, 1.VI.2014, leg. Frisch (IBPB, MNHB); 1♂, Pravda (Karaungur Valley at Arslanbob NR) (41°14′17″N 72°57′45″E), 1020 m, 1.VI.2014, leg. Frisch; 1♂, 1♀, NE Bazar-Kurganj: Charbak [Charvak] (Karaungur Valley at Arslanbob NR) [41°14′49″N 73°00′10″E], 900–1000 m, 18.V.1993, leg. Schawaller (SMNS); 1♀, SE Arslanbob: Jaradar [Yarodar] (Arslanbob NR) [41°19′18″N 72°58′16″E], 1400–1700 m, 16.–17.V.1993, leg. Golovatch.

Etymology

I name this new species in honour of my dear colleague Dr. Wolfgang Schawaller, Staatliches Museum für Naturkunde Stuttgart, who discovered it first in the Arslanbob Nature Reserve more than 20 years ago.

Diagnosis

Male: Abdominal sternite VIII with triangular emargination in about posterior fourth, two asetose latero-posterior impressions, and medio-posterior field of dark, long, latero-posteriad orientated setae as in Figs. 33, 34. Apical lobes of aedeagus (Figs. 24–26) in lateral view moderately slender and in distal half evenly curved dorsad, in dorsal and ventral view parallel in proximal third and strongly tapered towards extraordinarily thin and parallel apical half; dorsal lobe in lateral view strongly, club-like widened and subtruncate posteriorly with thin, tooth-like apex.

Female: Lateral gonocoxal plates broad, only about 2.5 times as long as wide (as in Figs. 40, 43, 56, 57). Bursa broad and parallel, about 1.8 times as long as wide, lateral gonocoxal plates thus widely separate, and with round sclerotized posterior end as in Figs. 56, 57.

Distribution

Scopaeus schawalleri n. sp. is known only from a small area in the upper Karaungur River Valley including the Arslanbob Nature Reserve in the southern Tien Shan north of the eastern end of the Fergana Basin (Fig. 63). While the Baubashata Mountain Range constitutes the distribution barrier towards the northwest, where *S. schawalleri* is replaced by *S. apiculatus* n. sp., the distribution towards the east and south is unknown.

Scopaeus chatkalensis **n. sp.**
(Figs. 8, 27–29, 35, 63)

Type material

Holotype ♂: Kyrgyzstan, Jalal-Abad, Chatkal River at Ak-Tash (NE Besh-Aral NR) (41°41′13″N 70°39′35″E), 1450 m, 14.VI.2014, leg. Frisch.

Etymology

The epithet "*chatkalensis*" (Latin, adjective: "from Chatkal") points to the type locality in the Chatkal Valley in the western Tien Shan.

Diagnosis

Male: Abdominal sternite VIII with comparatively short triangular emargination occupying about posterior fifth of sternite length, two latero-posterior impressions and medio-posterior field of dark, long, latero-posteriad orientated setae (Fig. 35). Dorsad curved end of apical lobes of aedeagus (Figs. 27–29) comparatively short and stout; apical lobes in dorsal and ventral view evenly convex laterally in more than proximal half and gradually tapered towards acute apices; dorsal lobe moderately widened; apex of flagellum moderately curved dorsad.

Female unknown.

Distribution

Scopaeus chatkalensis n. sp., endemic to the extreme west of the Tien Shan, is hitherto known from the upper Chatkal River in Kyrgyzstan only (Fig. 63). The Chat-

kal Mountain Range presumably constitutes the eastern limit of distribution, east of which the allopatric relative *S. apiculatus* n. sp. occurs, which was found as far west as Kashka-Suu only about 80 km east of the type locality of *S. chatkalensis*. In the western foothills of the Tien Shan, *S. chatkalensis* is replaced by the allopatric *S. likovskyi* Boháč, which was found near Tashkent about 80 km west of the type locality of the new species. The northern and southern limit of distribution is, however, unknown.

4.4 *Scopaeus caspius* **n. sp.**
(Figs. 2, 58–61, 62)

Type material

H o l o t y p e ♀: Azerbaijan, Lenkoran, SSE Lenkoran City: Avrora (Alekseyevka) [38°39′36″N 48°48′24″E], 14.VII.1978, leg. MIKHEECHEV (MZMC).

Etymology

The epithet "*caspius*" (Latin, adjective: "the Caspian") refers to the distribution of *Scopaeus caspius* n. sp. in the Caspian Plain of Azerbaidzhan west of the Caspian Sea.

Diagnosis

Total length 3.4 mm, forebody length 2.0 mm. Head and pronotum medium brown with slight reddish touch; elytra lighter brown except for dark scutellar triangle; abdomen blackish brown, but from posterior half of segment VII to genital segments gradually lighter brown; antennae and maxillary palpi except for slightly darker penultimate segment light reddish brown; legs light brown (Fig. 2). Head 1.08 times as long as wide, across tempora 1.06 times as wide as across eyes, thus notably trapezoidal. Eyes medium-sized, 0.54 times as long as tempora. Elytra 1.05 times as long as pronotum. Lateral denticles of labrum somewhat shorter than median denticles. Protarsomeres 2–4 strongly transverse, three times as wide as long. Mesotibia slender, 5.9 times as long as wide.

Male: Unknown.

Female: Lateral gonocoxal plates slender, 3.7 times as long as wide and with conspicuous, lamellar duplication at dorsal, towards body cavity orientated side (Fig. 60). Setose field of tergite X 2.3 times as long as wide (Fig. 59). Sclerotized posterior end of bursa narrow and triangular (Fig. 60).

Distribution

Scopaeus caspius n. sp. is known only from the easternmost foothills of the Talysh Mountains east of Avrora in the Lenkoran District (Fig. 62).

Remark

The description of a new species based on a single female only might cause criticism. *Scopaeus caspius* n. sp., however, is the first member of the *S. obscuripes* group in the Middle East. It can easily be distinguished from Middle Eastern *Scopaeus* by the shape of the sclerotized posterior end of the bursa (Fig. 60). From the Central Asian relatives, *S. caspius* n. sp. differs by the shape of the posterior end of the bursa or by the light coloured body with long elytra (Fig. 2). The presence of a Central Asian member west of the Caspian Sea is, however, unlikely in view of the endemic distribution patterns in the *S. obscuripes* group (Figs. 62, 63).

The phylogenetic position of *Scopaeus caspius* n. sp. within the *S. obscuripes* species group cannot be determinated, since the male genital characters are unknown.

4.5 Key to the species of the *Scopaeus obscuripes* group

The following key to the *Scopaeus obscuripes* species group summarizes the major distinguishing characters of the phylogenetic lineages of the species group and the species included. It replaces formal comparative notes to the species diagnoses and serves as an introduction to the phylogeographic discussion below.

1 Distributed in Middle East (Talysh). – Male unknown. – Female: Lateral gonocoxal plates with conspicuous, lamellar duplication at dorsal, towards body cavity orientated side (Fig. 60); sclerotized posterior end of bursa triangular. – Forebody light reddish brown, abdomen blackish brown, appendages light brown (Fig. 2). ..... ***Scopaeus caspius* n. sp.**

– Distributed in Central Asia. – Female (in two species unknown): Lateral gonocoxal plates without lamellar duplication at dorsal, towards body cavity orientated side..... **2**

2 Male: Apical lobes of aedeagus in lateral view slender, subparallel, and with dorsad curved end, in dorsal view broad and parallel with subtruncate apex; flagellum as long as apical lobes, straight, and with very thin end and strong, subapical, ventral tooth (FRISCH 2008: figs. 1–3). – Hindukush (FRISCH 2008: fig. 17)..... ***S. klapperichi***

– Male: Apical lobes of aedeagus with strong ventral or apicolateral enlargements, or flagellum only half as long as apical lobes..... **3**

3 Male: Dorsal lobe of aedeagus vestigial (Figs. 9, 11). – Female: Sclerotized portion of spermathecal duct thick and short, about five times as long as sperm pump only (Figs. 46–50), or thin, very long and winding, about 12 times as long as sperm pump (Fig. 51)..... *S. asiaticus* lineage **4**

– Male: Dorsal lobe of aedeagus about half as long as apical lobes; apical lobes long, narrow, in about distal half to distal third evenly curved dorsad and with thin, acute apex (Figs. 12–29). – Female: Sclerotized portion of spermathecal duct thin, about six times as long as sperm pump (Figs. 53–57)..... *S. likovskyi* lineage **6**

4 Male: Abdominal sternite VIII semicircularly emarginate (Fig. 30); apical lobes and flagellum of aedeagus (Figs. 9–11) at basis almost right-angled orientated ventrad, after that almost right-angled bent in longitudinal direction and straight towards end; apical lobes very slender with laterally triangularly widened apices; flagellum slender without denticles or lobiform modifications. – Female: Bursa slender with round or triangular sclerotized posterior end and very

fine, deciduous anterior end (Figs. 46, 48); sclerotized portion of spermathecal duct thick and short, about five times as long as sperm pump only (Figs. 46–50). – Dark brown to black species with blackish brown appendages and parallel head with strongly convex posterior margins (Fig. 1). – Alai Mountains..... ***S. asiaticus***

– Male: Abdominal sternite VIII triangularly emarginate, in posterior half with strongly sclerotized, elevated midline and two lateral, asetose impressions (Frisch 1999a: figs. 10, 11); apical lobes and flagellum of aedeagus not strongly bent ventrad at basis, less slender with various modifications.....**5**

5 Male: Apical lobes of aedeagus with strong, ventro-proximad curved tooth in middle of length; flagellum strongly, almost semicircularly curved ventrad with apex semicircularly bent dorsad and ventral margin notably serrate (Frisch 1999a: figs. 4–6). – Female: Bursa very large, about 0.8 times as long as lateral gonocoxal plates, from long triangular sclerotized end evenly widened towards isosceles-shaped anterior third (Fig. 51); sclerotized portion of spermathecal duct very long and winding, about 12 times as long as sperm pump (Fig. 51). – Light coloured species with yellowish or reddish brown forebody and appendages and darker brown abdomen. – Hindukush, Kashmir. ..... ***S. kabakovi***

– Male: Apical lobes of aedeagus with remarkable, lobiform, ventro-distal enlargement and broad triangular, dorsad curved, acute end; flagellum somewhat longer than apical lobes, with long and narrow, proximad pointing lobe in middle of proximal half, in distal half strongly curved dorsad (Frisch 1999a: figs. 1–3). – Female unknown. – Blackish brown species with brown appendages. – Siwalik Range (Fig. 62)..... ***S. obscuripes***

6 Male: Abdominal sternite VIII without modifications (Figs. 31–32). – Female: Lateral gonocoxal plates slender, about 4–5 times as long as wide (Figs. 38, 39), close to each other due to slender, triangular sclerotized end of bursa (Figs. 53, 54) or widely separate due to broad, semicircular end of bursa (Fig. 55)..... **7**

– Male: Abdominal sternite VIII with posterior field of long, dark, latero-posteriad pointing setae and two lateral, asetose depressions (Figs. 33–35). – Female (female of *S. chatkalensis* unknown): Lateral gonocoxal plates broad, about 2.5 times as long as wide (Figs. 40, 43) and widely separate (Figs. 56, 57); sclerotized end of bursa semicircular (Figs. 56, 57)..... **8**

7 Male: Apical lobes of aedeagus in almost proximal half notably concave laterally, somewhat attenuate (Figs. 13, 14); end of flagellum evenly curved dorsad (Fig. 12). – Female: Lateral gonocoxal plates slender, about five times as long as wide (Figs. 38, 53, 54); bursa slender, with notably convex lateral margins widened anteriad and narrow sclerotized posterior end, thus lateral gonocoxal plates situated close to each other (Figs. 53, 54). – Very west of Tien Shan and western Alai, Hindukush (Fig. 63). ..... ***S. likovskyi***

– Male: Apical lobes of aedeagus in almost proximal half convex laterally (Figs. 16, 17); outermost end of flagellum angled bent dorsad (Fig. 15). – Female: Lateral gonocoxal plates broader, about four times as long as wide (Figs. 39, 55); bursa subparallel with much broader, almost semicircular sclerotized posterior end, thus lateral gonocoxal plates widely separate (Fig. 55). – Northern incline of Tien Shan (Fig. 63)..... ***S. milkoi* n. sp.**

8 Male: Apical lobes of aedeagus in median third triangularly extended laterally, in dorsal and lateral view V-shaped like arrowhead (Figs. 19, 20, 22, 23)..... **9**

– Male: Apical lobes of aedeagus without triangular lateral extension (Figs. 25, 26, 28, 29)..... **10**

9 Male: Apical third of apical lobes of aedeagus needle-thin in lateral view (Fig. 18). – Southwest Tien Shan between Chatkal and Baubashata Mountain Ranges (Fig. 63). ..... ***S. apiculatus* n. sp.**

– Male: Distal third of apical lobes of aedeagus in lateral view much broader, evenly tapered towards acute apex (Fig. 21). – Turkestan Mountain Range: Isfairam-Say (Fig. 63). ..... ***S. moriturus* n. sp.**

10 Male: Apical lobes of aedeagus in distal half evenly curved dorsad (Fig. 24), in dorsal and ventral view parallel in proximal half, but strongly tapered towards extraordinary thin and parallel apical half (Figs. 25, 26); dorsal lobe in lateral view club-like widened, almost truncate posteriorly with thin, tooth-like apex (Fig. 24). – Southwest Tien Shan: Karaungur Valley (Fig. 63)..... ***S. schawalleri* n. sp.**

– Male: Apical lobes of aedeagus in apical third only more strongly curved dorsad (Fig. 27), in dorsal and ventral view in proximal half convexly enlarged laterally and in distal half less narrow and evenly tapered, not parallel (Figs. 28, 29); dorsal lobe in lateral view much more slender posteriorly (Fig. 27). – Western Tien Shan: Chatkal Valley (Fig. 63)..... ***S. chatkalensis* n. sp.**

4.6 Phylogeography

The cladistic analysis of the West Palaearctic Scopaeina performed by Frisch et al. (2002) was confined to the taxa the current distribution pattern of which goes back to the Pleistocene refuges of the arboreal fauna in the Mediterranean and the Middle East sensu De Lattin (1949, 1951) and thus did not include the Central Asian species groups. Nevertheless, the results of this study make it possible to propose a hypothesis on the phylogenetic position of the *S. obscuripes* group. Within *Scopaeus* Erichson, 1839, the *S. obscuripes* species group shares the apomorphic characters of *Scopaeus* s. str., which are the typical set of distal lobes of the aedeagus with two lateral, testaceous apical lobes and a dorsal lobe between them, the simple flagellum of the aedeagus without surrounding denticles, and the terminal process of the chamber segment of the sperm pump (Frisch et al. 2002: 38).

Within that subgeneric clade, the *S. obscuripes* group shows derived characters of modern phylogenetic lineages. It shares the relevant apomorphic characters of the terminal clade of West Palaearctic *Scopaeus* s. str., which in the Mediterranean and the Middle East comprises the *S. sulcicollis* (Frisch 1999c) and *S. elegans* (e. g. Frisch 2010: 163–189) species groups. These characters are the lack of setiferous lateral lobes of the aedeagus (Figs. 8–29) and the long, winding sclerotized portion of the spermathecal duct (Figs. 46, 48, 49, 51–57), which, contrary to Frisch et al. (2002: 41), is also present in the former grouping. The Central Asian *S. similis* group shares these synapomorphic characters as well (Frisch 2014: 218). Within this phylogenetically young clade of monophyletic species groups

in the West Palaearctic, the *S. obscuripes* species group differs by the hyaline bursa with sclerotized posterior end (Figs. 46, 48, 49, 51–57, 60) – a unique sclerotization pattern of the bursa, which I consider as autapomorphy suitable to postulate a monophyletic *S. obscuripes* species group.

Not enough is known about diversity and biogeography of the *S. obscuripes* species group to erect a sound hypothesis on the phylogenetic relationships within this grouping. Two obvious evolutionary clades, the *S. asiaticus* and *S. likovskyi* lineages, are however discernible. Judging from their distribution pattern in the Central Asian mountains, they constitute sympatric clades of strictly allopatric members and are good examples for speciation through multiple radiation. The scattered finds of the three hitherto known species of the *S. asiaticus* lineage from the Alai south to the Hindukush and the Siwalik Range in the Lesser Himalayas (Fig. 62) suggest a more southern distribution of this phylogenetic lineage, while the numerous records from the Tien Shan and the Alai Mountains in contrast to only one record from the Hindukush point to a more northern distribution of the *S. likovskyi* lineage (Fig. 63).

The *S. asiaticus* lineage is a distinct monophyletic group judging from the vestigial dorsal lobe (Figs. 9, 11), a unique character within Palaearctic *Scopaeus*. The three hitherto known species moreover agree in the remarkable flagellum of the aedeagus, which is considerably lengthened and apparently replaces the reduced dorsal lobe. Judging from the very slender apical lobes and the flagellum without modifications (Figs. 9–11), *S. asiaticus* Bernhauer represents a northern lineage in the Alai Mountains, while *S. kabakovi* Gusarov (Frisch 2008: figs. 7–9) and *S. obscuripes* Cameron (Frisch 2008: figs. 10–12) constitute a southern lineage in the Hindukush, Kashmir, and Himalayas with tooth-like or lobiform ventral modifications of the flagellum and, in lateral view, broad, modificate apical lobes of the aedeagus.

The second grouping, the *S. likovskyi* lineage, is mainly characterized by the typical shape of the aedeagus as described in the diagnosis of this clade above (Figs. 12–29), the matching length of the sclerotized portion of the spermathecal duct (Figs. 53–57), and moreover by the adaptation to ephemeral brooks and rivulets, characters which I consider as synapomorphic for the species included. Within the *S. likovskyi* lineage, *S. likovskyi* Boháč and *S. milkoi* n. sp. are obvious sister species according to the similar shape of the aedeagus with extremely slender apical lobes (Figs. 12–17) and the simple abdominal sternite VIII of the males without a medio-posterior field of long, dark setae (Figs. 31, 32). That field of long, latero-posteriorly orientated setae (Figs. 33–35) constitutes the synapomorphy of *S. apiculatus* n. sp., *S. chatkalensis* n. sp., *S. moriturus* n. sp., and *S. schawalleri* n. sp., an eastern clade of the *S. likovskyi* lineage. Judging from the derived triangular median third of the apical lobes of the aedeagus (Figs. 19, 20, 22, 23), *S. apiculatus* and *S. moriturus* constitute another couple of sister species, even though their areals north and south of the Fergana Basin at about the same longitude seem to be widely separate and are interrupted by the areal of *S. schawalleri* east of the basin (Fig. 63).

Scopaeus klapperichi Frisch from the Hindukush with a well developed dorsal lobe and a remarkably lengthened, ventrally dentate flagellum (Frisch 2008: figs. 1–3), however, does not fit either phylogenetic lineage. The relationships of *S. caspius* n. sp. are also unknown since no males have been found yet.

A sound phylogeographic concept of the *S. obscuripes* group requires extensive future investigations in the mountains of Central Asia, where most likely dozens of unknown species still await their discovery.

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Contribution to the knowledge of the Scaphidiinae (Coleoptera: Staphylinidae) of the Moluccas

Ivan Löbl

Abstract

The following new species are described from the Moluccan Islands Halmahera, Morotai, and Ternate: *Baeocera vicina* **n. sp.**, *Baeocera vafra* **n. sp.**, *Baeocera variata* **n. sp.**, *Bironium flavapex* **n. sp.**, *Scaphisoma perminutum* **n. sp.**, *Scaphisoma perleve* **n. sp.**, *Scaphisoma persimilans* **n. sp.**, *Scaphisoma perfectum* **n. sp.**, *Scaphisoma perturbator* **n. sp.**, *Scaphisoma permutatum* **n. sp.**, *Scaphisoma peraffirmatum* **n. sp.**, *Scaphisoma perdecorum* **n. sp.**, *Scaphisoma spinosum* **n. sp.**, *Scaphisoma spatulatum* **n. sp.**, *Scaphisoma permixtum* **n. sp.**, and *Scaphisoma peregrinum* **n. sp.** A key to the Moluccan Scaphidiinae is provided.

K e y w o r d s : Coleoptera, Staphylinidae, Scaphidiinae, Moluccas, new species, taxonomy.

Zusammenfassung

Die folgenden neuen Arten werden von den Molukken-Inseln Halmahera, Morotai und Ternate beschrieben: *Baeocera vicina* **n. sp.**, *Baeocera vafra* **n. sp.**, *Baeocera variata* **n. sp.**, *Bironium flavapex* **n. sp.**, *Scaphisoma perminutum* **n. sp.**, *Scaphisoma perleve* **n. sp.**, *Scaphisoma persimilans* **n. sp.**, *Scaphisoma perfectum* **n. sp.**, *Scaphisoma perturbator* **n. sp.**, *Scaphisoma permutatum* **n. sp.**, *Scaphisoma peraffirmatum* **n. sp.**, *Scaphisoma perdecorum* **n. sp.**, *Scaphisoma spinosum* **n. sp.**, *Scaphisoma spatulatum* **n. sp.**, *Scaphisoma permixtum* **n. sp.**, and *Scaphisoma peregrinum* **n. sp.** Eine Bestimmungstabelle der Scaphidiinae der Molukken wird gegeben.

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1 Introduction

Currently, only ten species of the shining fungus beetles, Scaphidiinae, are known from four of the Moluccan Islands Buru, Yamdena, Kai Besar, and Tanimbar (Löbl 1976, 2014a). They belong to two genera, *Baeocera* Erichson, 1845 with three, and *Scaphisoma* Leach, 1815 with seven Moluccas species. A study of a new collection housed in the Staatliches Museum für Naturkunde in Stuttgart yields an additional genus, *Bironium* Csiki, 1909, represented by a single new species, four species of *Baeocera*, and 12 new species of *Scaphisoma*. The material was collected by a single person, A. Riedel, on the Halmahera, Morotai, and Ternate Islands. Thus, Scaphidiinae are at present known by 26 species from seven islands of the Moluccan Archipelago, a quite impressive number compared to the 45 species in six genera currently known from the Lesser Sunda Islands (Löbl 2015), or 15 species in six genera reported from Sulawesi (Löbl 1997, Ogawa et al. 2014).

One of the Moluccan species, though undescribed, remains unnamed, in absence of males.

Among the Moluccan scaphidiines, only *Baeocera yamdena* Löbl, 2014, *Scaphisoma apterum* Löbl, 2014 and *S. semibreve* Löbl, 2014 are apterous and likely endemic to the Yamdena and Kai Besar Islands, respectively. Though all other species have well developed hind wings, most are known from a single island and only *Scaphisoma coarctatum* Löbl, 1976 and *S. luteomaculatum* Pic, 1915 are known to be widely distributed. The latter species was previously reported from Buru (Löbl 2014a) under the synonymous name *S. dansalanese* Löbl, 1972.

Acronyms of depositories

MHNG Muséum d'histoire naturelle, Genève, Switzerland
SMNS Staatliches Museum für Naturkunde Stuttgart, Germany

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2 Material and methods

The body length is measured from the anterior pronotal margin to the inner apical angle of the elytra. The maximal length and width ratios of the antennomeres are given, measured on slides. Characters given for metanepisterna concern their exposed parts. The abdominal sternites are counted from the first visible one (i. e., the third morphological sternite). The statements about abdominal microsculpture do not refer to that of the intersegmental membranes. The sides of the aedeagi refer to their morphological sides, with the ostium situated dorsally, while it is in the resting position rotated 90°. The eventually extruded parts of the internal sacs of the aedeagi are not considered in length measurements. Female characters are described and illustrated only in taxa for which they are considered discriminating.

3 Results

3.1 New species of *Baeocera* Erichson, 1845

Baeocera vicina **n. sp.**
(Figs. 1–5)

Holotype ♂: Moluccas, Halmahera Island, 28 km S Tobelo, Togoliua, 2.XI.1999, ca. 200 m, leg. A. Riedel (SMNS).

Paratypes: 3 ♂♂, 2 ♀♀, with the same data as the holotype (SMNS, MHNG); 1 ♂, 1 ♀, Moluccas, Halmahera Island, Buli, Maba, 6.XI.1999, ca. 20 m, leg. A. Riedel (SMNS, MHNG); 1 ♀, Moluccas, Halmahera Island, Ibu, Kamp. baru, Gn. Alon, 25.XI.1999, 800 m, leg. A. Riedel (SMNS); 1 ex., Moluccas, Halmahera Island, Tobelo (SW) 1.XI.1999, 850 m, A. Riedel (SMNS); 1 ♂, 1 ♀, Moluccas, Halmahera Island, Sidangoli, Batu putih, 23.XI.1999, 100 m, leg. A. Riedel (SMNS, MHNG); 2 ♂♂, 2 ♀♀, Moluccas, Morotai Island, W Daruba, Raja, 16.XI.1999, ca. 250 m, leg. A. Riedel (SMNS).

Etymology

The species epithet is a Latin adjective meaning close.

Description

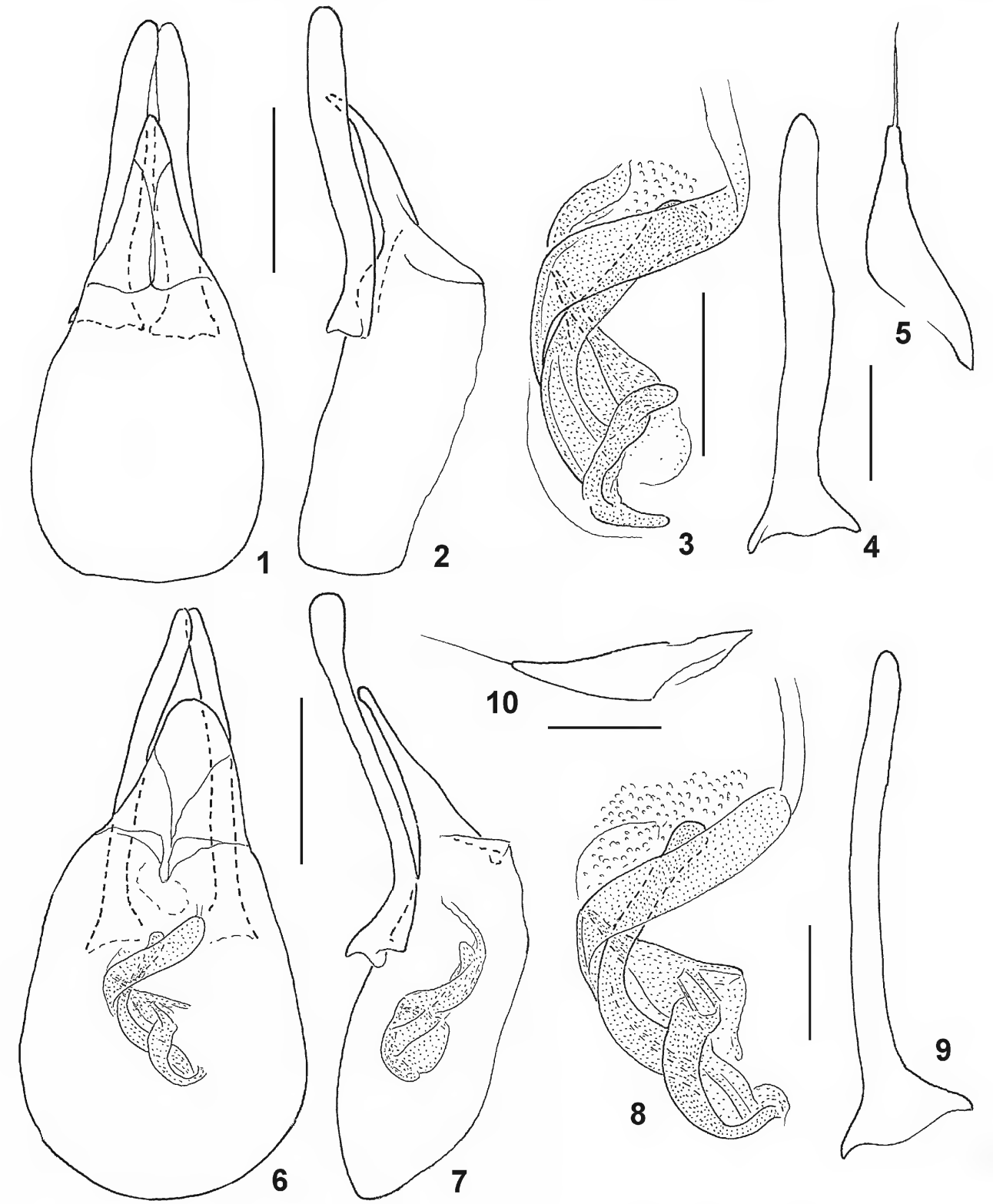
Body length 1.20–1.33 mm, width 0.80–0.95 mm. Body strongly convex, without obvious microsculpture. Head and body very dark brown to blackish, usually with reddish shine. Femora and tibiae somewhat lighter than body, tarsi and antennae light brown. Length ratio of antennomeres as follows: III 30: IV 30: V 36: VI 35: VII 40: VIII 35: IX 42: X 42: XI 46; antennomeres IV–VI evenly narrow, slightly wider than III and slightly narrower than VII or VIII; IX about twice as wide as VIII and four times as long as wide, the following gradually widened, XI about three times as long as wide. Lateral contours of pronotum and elytra almost continuously arcuate. Pronotum with punctation very fine, eventually distinct near base, setation hardly visible (50x magnification), lateral margins convex, anterior margin broad, basal lobe well developed; lateral pronotal carinae visible near base or entirely concealed in dorsal view. Minute tip of scutellum exposed. Elytra weakly narrowed apically, almost covering abdominal apex, lateral margin carinae concealed or hardly visible in dorsal view, sutural striae shortened, starting posterior to level of scutellar tip; basal striae absent; adsutural areas flat, parallel, punctate. Elytral punctation distinct and even on entire disc, with puncture intervals mostly as large to three times as large as puncture diameters. Epipleural striae reaching posterior to level of sternite 2, impunctate, supraepipleural areas with puncture row. Hind wings well developed. Hypomera impunctate, smooth. Mesoventral suture indistinct, mesoventrite distinctly punctate, without median ridge. Mesepimera large, each about three times as long as wide and about four times as long as interval to metacoxae. Median part of metaventrite convex, with smooth centre delimited laterally and apically by coarse punctures. Lateral parts of metaventrite coarsely punctate, except on smooth areas near metacoxae. Punctures on lateral parts of metaventrite round or to part slightly elongate, smaller than or about as large as puncture intervals. Submesocoxal lines parallel, with marginal punctures extending laterally, submesocoxal areas about 0.02 mm long, about as one fifth of interval to metacoxae. Metanepisterna very narrow, with suture indicated by weakly impressed outer puncture row. Tibiae straight. Sternite 1 with coarse basal punctures not or slightly elongate, usually contiguous in the middle, basal wrinkles absent; with coarse punctation becoming sparse on median area. Punctation on following sternites distinct.

♂: Protarsomeres hardly widened. Aedeagus (Figs. 1–4) 0.32–0.34 mm long, moderately sclerotized. Median lobe symmetrical, with apical process shorter than basal bulb, gradually narrowed apically and inflexed near tip, with tip acute in lateral view. Articular process indistinct. Parameres long, almost evenly wide, hardly sinuate in lateral view. Internal sac complex, with apical part of flagellar-guide sclerite weakly widened, membranes posterior to sclerite complex extremely finely denticulate.

♀: Ovipositor (Fig. 5) with distal gonocoxite absent, gonostyle weakly curved, gradually narrowed, with one long apical seta.

Comparative notes

Member of the *B. lenta* group and similar to the New Guinean *B. provida* Löbl, 2002 and *B. prolixa* Löbl, 2002.



Figs. 1–10. *Baeocera* spp., genitalia. □ **1–5**. *B. vicina* n. sp., aedeagus, without internal sac, in dorsal (1) and lateral (2) views, internal sac in dorsal view (3), paramere in dorsal view (4), ovipositor (5). □ **6–10**. *B. vafra* n. sp., aedeagus in dorsal (6) and lateral (7) views, internal sac in dorsal view (8), paramere in ventral view (9), ovipositor (10). – Scale bars: 0.1 mm (1, 2, 6, 7), 0.05 mm (3–5, 8–10).

It may be distinguished by: Body very dark, 1.20–1.33 mm long. Antennomere VIII longer than IV or V. Elytra with sutural striae shortened, basal striae absent, entire elytral disc distinctly punctate. Mesoventral carina absent. Metaventrite coarsely punctate, excepted in the middle. Metanepisternal suture indicated by outer puncture row. Sternite 1 lacking basal wrinkles, basal punctures not or slightly elongate. Aedeagus with tip of median lobe bent, acute. Parameres almost evenly wide in both, dorsal and lateral views. Apex of flagellar guide-sclerite weakly widened.

Baeocera vafra **n. sp.**
(Figs. 6–10)

Holotype ♂: Moluccas, Halmahera Island, Tobelo (SW) 1.XI.1999, 850 m, A. Riedel (SMNS).

Paratypes: 3♂♂, 6♀♀, with the same data as the holotype (SMNS, MHNG); 1♂, Moluccas, Halmahera Island, Ibu, Kamp. baru, Gn. Alon, 25.XI.1999, 800 m, leg. A. Riedel (SMNS).

Etymology
The species epithet is a Latin adjective meaning bright, keen.

Description
Body length 1.05–1.23 mm, width 0.70–0.85 mm. Body strongly convex, without obvious microsculpture. Head and body blackish, eventually with reddish shine. Femora and tibiae reddish-brown, tarsi and antennae lighter than femora. Length ratio of antennomeres as follows: III 26: IV 24: V 29: VI 27: VII 29: VIII 31: IX 38: X 36: XI 42; antennomeres III–VI evenly narrow, slightly narrower than VIII; IX slightly wider than VII and about four times as long as wide, the following gradually widened, XI almost three times as long as wide. Lateral contours of pronotum and elytra separately arcuate. Pronotum with punctation very fine, even, setation hardly visible (50x magnification), lateral margins convex, anterior margin broad, basal lobe well developed; lateral pronotal carinae usually visible near base. Minute tip of scutellum exposed. Elytra weakly narrowed apically, covering abdominal apex, lateral margin carinae concealed or hardly visible in dorsal view, sutural striae entire, curved along pronotal lobe to form very fine basal striae reaching about basal mid-width of elytra; adsutural areas flat, parallel, punctate. Elytral punctation distinct and even on entire disc, with puncture intervals mostly almost as large as to three times as large as puncture diameters. Epipleural striae extending posterior to level of sternite 2, impunctate, supraepipleural areas impunctate. Hind wings well developed. Hypomera impunctate, smooth. Mesoventral suture indistinct, mesoventrite distinctly punctate, without median ridge. Mesepimera large, each about three times as long as wide and about four times as long as interval to metacoxae. Median part of metaventrite convex, with smooth centre delimited laterally and apically by coarse punctures. Lateral parts of metaventrite coarsely punctate, except on smooth areas near metacoxae. Punctures on lateral parts of metaventrite round or slightly elongate, smaller than or about as large as puncture intervals. Submesocoxal lines parallel, with marginal punctures extending laterally, submesocoxal areas about 0.03 mm long, about as one third of interval to metacoxae. Metanepisterna very narrow, suture indicated by outer puncture row. Tibiae straight. Sternite 1 with coarse basal punctures uninterrupted in the middle, not or slightly elongate, basal wrinkles absent; with coarse punctation becoming sparse on median area. Punctation on following sternites indistinct.

♂: Protarsomeres hardly widened. Aedeagus (Figs. 6–9) 0.35–0.38 mm long, moderately sclerotized. Median lobe symmetrical, with apical process shorter than basal bulb, conspicuously wide and broadly rounded at apex in dorsal view, tip blunt, near tip not inflexed and very narrow in lateral view. Articular process small. Parameres long, almost evenly narrow and weakly curved in dorsal view, slightly sinuate and at apex somewhat widened and bent dorsally in lateral view. Internal sac complex, with apical part of flagellar-guide sclerite slightly widened, membranes posterior to sclerite complex extremely finely denticulate.

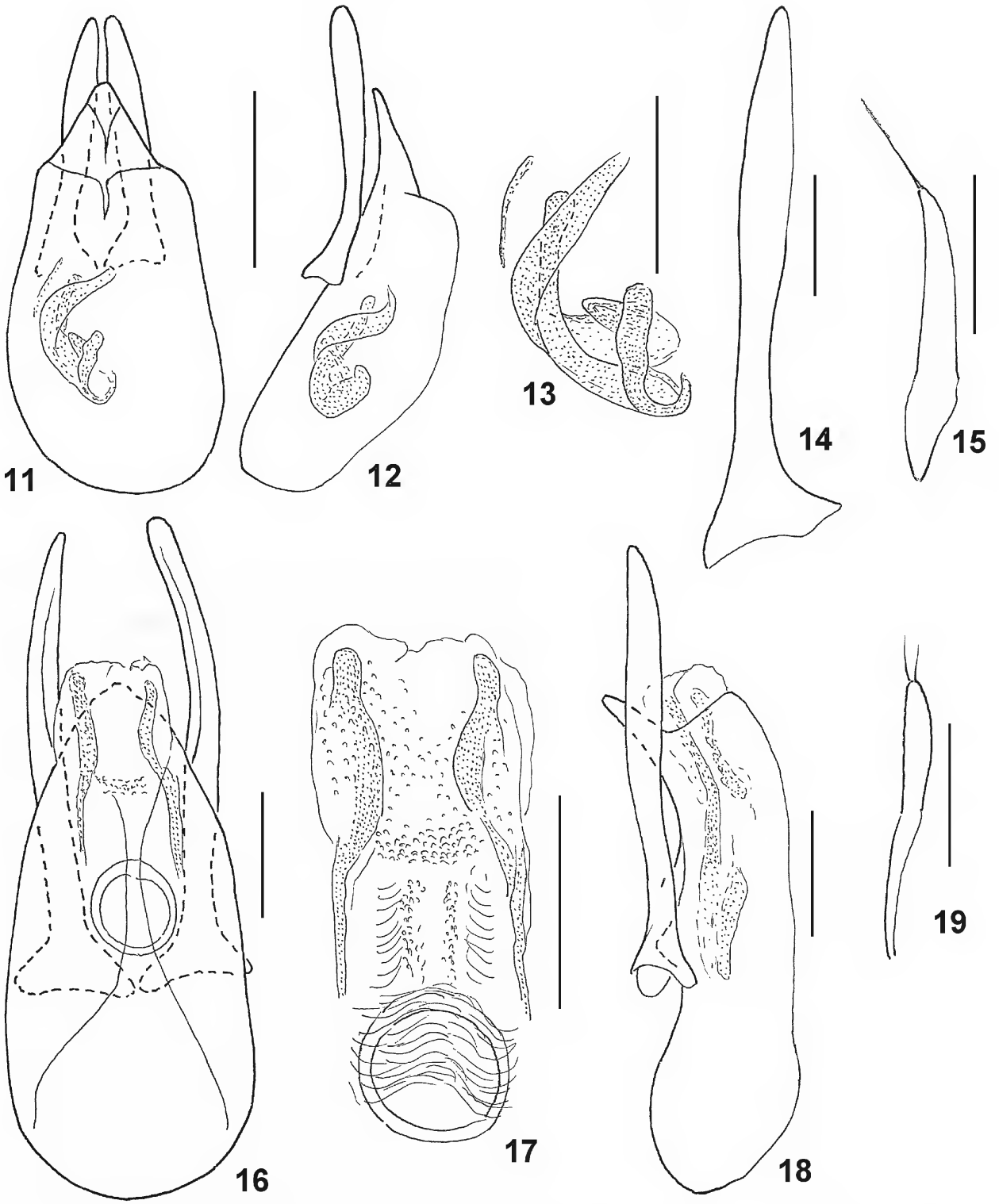
♀: Ovipositor (Fig. 10) with distal gonocoxite absent, gonostyle weakly curved, gradually narrowed, with one long apical seta.

Comparative notes
Member of the *B. lenta* group and similar to *B. vicina* n. sp. It is characterized by: Body blackish, 1.05–1.23 mm long. Antennomere VIII longer than preceding antennomeres. Elytra with sutural striae entire, basal striae present but very fine, entire elytral disc distinctly punctate. Mesoventral carina absent. Metaventrite coarsely punctate, except in the middle and along metacoxae. Metanepisternal suture indicated by outer puncture row. Sternite 1 lacking basal wrinkles, basal punctures not elongate. Aedeagus with tip of median lobe not bent, blunt. Parameres evenly wide in dorsal view, widened and bent dorsally at apices in lateral view. Apex of flagellar guide-sclerite weakly widened.

Baeocera variata **n. sp.**
(Figs. 11–15)

Holotype ♂: Moluccas, Halmahera Island, Tobelo (SW) 1.XI.1999, 850 m, A. Riedel (SMNS).

Paratypes: 3♂♂, with the same data as the holotype (SMNS, MHNG); 1♂, 3♀♀, Moluccas, Halmahera Island, 28 km S Tobelo, Togoliua, 2.XI.1999, ca. 200 m, leg. A. Riedel (SMNS, MHNG); 1♂, Moluccas, Halmahera Island, Buli, Maba, 6.XI.1999, ca. 20 m, leg. A. Riedel (SMNS).



Figs. 11–19. *Baeocera* and *Bironium* spp., genitalia. □ **11–15**. *Baeocera variata* n. sp., aedeagus in dorsal (11) and lateral (12) views, internal sac in dorsal view (13), paramere in ventral view (14), ovipositor (15). □ **16–19**. *Bironium flavapex* n. sp., aedeagus in dorsal (16) and lateral (18) views, paramere in dorsal view (17), ovipositor (19). – Scale-bars: 0.1 mm (11, 12, 16–19), 0.05 mm (13–15).

Etymology

The species epithet is a Latin adjective meaning different.

Description

Body length 1.05–1.10 mm, width 0.70–0.80 mm. Body strongly convex, without obvious microsculpture. Head, body and femora fairly light reddish-brown, tibiae somewhat lighter, tarsi and antennae distinctly lighter. Length ratio of antennomeres as follows: III 22: IV 22: V 33: VI 28: VII 33: VIII 30: IX 36: X 36: XI 39; antennomeres III–VI evenly narrow, slightly narrower than VIII; IX about as wide as VII and about four times as long as wide, the following gradually widened, XI almost four times as long as wide. Lateral contours of pronotum and elytra continuously arcuate. Pronotum with punctation fairly fine, almost even, distinct at 20 × magnification; setation hardly visible (50 × magnification); lateral margins convex, anterior margin broad, basal lobe well developed; lateral pronotal carinae not visible. Minute tip of scutellum exposed. Elytra weakly narrowed apically, covering abdominal apex, lateral margin carinae concealed or hardly visible in dorsal view, sutural striae entire, curved along pronotal lobe to form very fine basal striae almost reaching basal mid-width of elytra; adsutural areas flat, parallel, punctate. Elytral punctation fairly coarse and even on entire disc, with puncture intervals mostly almost as large as to twice as large as puncture diameters. Epipleural striae extending posterior to level of sternite 2, impunctate, supraepipleural areas impunctate. Hind wings well developed. Hypomera impunctate, smooth. Mesoventral suture indistinct, mesoventrite distinctly punctate, without median ridge. Mesepimera large, each about five times as long as wide and about four times as long as interval to metacoxae. Median part of metaventrite convex, with smooth centre delimited laterally and apically by coarse punctures. Lateral parts of metaventrite coarsely punctate, with punctures round, smaller than or about as large as puncture intervals. Submesocoxal lines subparallel, with marginal punctures extending laterally, submesocoxal areas about 0.03 mm long, about as one third of interval to metacoxae. Metanepisterna very narrow, suture indicated by outer puncture row. Tibiae straight. Sternite 1 with basal punctures coarse, interrupted in the middle, not elongate, basal wrinkles absent; with punctation fairly coarse, becoming sparse mesally. Punctation on following sternites very fine.

♂: Protarsomeres hardly widened. Aedeagus (Figs. 11–14) 0.26–0.28 mm long, moderately sclerotized. Median lobe symmetrical, with apical process much shorter than basal bulb, gradually narrowed, not inflexed at tip, tip fairly robust in lateral view. Articular process small. Parameres fairly long, straight and slightly widened posterior to mid-length in dorsal view, barely sinuate, somewhat narrowed at apex and not bent dorsally in lateral view. Internal sac complex, with apical part of flagellar-guide sclerite slightly widened, membranes without denticulate structures.

♀: Ovipositor (Fig. 15) with distal gonocoxite absent, gonostyle distinctly curved, gradually narrowed, with one long apical seta.

Comparative notes

Member of the *B. lenta* group and similar to *B. vicina*. It may be distinguished by: Body reddish-brown, 1.05–1.10 mm long. Antennomere VIII shorter than VII. Pronotal punctation distinct. Elytra with sutural striae entire, basal striae present but very fine, entire elytral disc distinctly punctate. Mesoventral carina absent. Metaventrite coarsely punctate, its centre excepted. Metanepisternal suture indicated by outer puncture row. Sternite 1 lacking basal wrinkles, basal punctures not elongate. Aedeagus with tip of median lobe not bent, fairly acute. Parameres widened posterior to mid-length in dorsal view, widened, not bent dorsally at apices in lateral view. Apex of flagellar guide-sclerite weakly widened.

Undescribed species

Baeocera sp. A

Material examined: 1 ♀, Moluccas, Halmahera Island, Ibu, Kamp. baru, Gn. Alon, 25.XI.1999, 800 m, leg. A. Riedel (SMNS).

Diagnostic characters

Body length 1.05 mm, width 0.75 mm. Body lacking microsculpture, uniformly light reddish-brown. Pronotum very finely punctate. Elytra with sutural striae extending along margin of pronotal lobe to form short basal striae, reaching basal mid-width; elytral disc all over distinctly punctate, puncture intervals mostly 1.5 to three times as large as puncture diameters. Hind wings well developed. Hypomera impunctate. Lateral parts of metaventrite transversally convex, appearing impunctate except for coarse punctures along submesocoxal lines and anterior margin. Metanepisterna large, 0.08 mm wide, convex, with impunctate suture. Sternite 1 impunctate except for uninterrupted row of coarse basal puncture.

Comments

The species is possibly undescribed. I prefer to keep it unnamed as long as its male characters are not known.

3.2 New species of *Bironium* Csiki, 1909

Bironium flavapex **n. sp.**
(Figs. 16–19)

Holotype ♂: Moluccas, Morotai Island, W Daruba, Raja, 16.XI.1999, ca. 250 m, leg. A. Riedel (SMNS).

Paratypes: 11 ♂♂, 6 ♀♀, with the same data as the holotype (SMNS, MHNG); 4 ♂♂, 1 ♀, Moluccas, Halmahera Island, 28 km S Tobelo, Togoliua, 2.XI.1999, ca. 200 m, leg. A. Riedel (SMNS, MHNG); 1 ♂, Moluccas, Halmahera Island, Buli, Maba, 6.XI.1999, ca. 20 m, leg. A. Riedel (SMNS).

Etymology

The species epithet is derived from the Latin adjective flavum, yellow, and the noon apex, meaning summit.

Description

Body length 1.75–1.90 mm, width 1.15–1.28 mm. Head, body and femora black, shining. Tibiae reddish brown. Tarsi and antennae lighter than tibiae, apical antennomeres yellowish. Pronotal punctation extremely fine, hardly visible at 80 × magnification. Tip of scutellum exposed, rounded. Elytra lacking humeral humps, each with oblique rows of coarse punctures. Inner puncture row starting about 0.15–0.20 mm posterior to basal margin, in weakly or not impressed line, ending about at or somewhat posterior to elytral mid-length, with punctures becoming smaller apically. Second and third puncture rows in grooves, reaching apical eighth to tenth of elytra; third row irregular in anterior section, starting close to anterior margin. Additional row of few coarse punctures present between third puncture row and lateral margin. Intervals between puncture rows convex. Sutural striae deep, punctate; adsutural areas roof-like. A few fairly coarse punctures present near inner apical angles, remaining discal punctation almost reduced; lateral striae punctate. Hind wings well developed. Mesoventrite extremely finely punctate, without striae, lacking median carina. Median part of metaventrite appearing impunctate, two or three coarse admesal punctures excepted. Submesocoxal lines coarsely punctate. Areas between mesocoxae and metacoxae convex. Lateral parts of metaventrite with a few coarse punctures between mesocoxae and metanepisterna, remaining surface appearing impunctate. Metanepisterna narrow, with deep, sulciform suture evanescent posteriorly. Tibiae evenly narrow, protibiae slightly curved, mesotibiae and metatibiae straight, mesotibiae and protibiae slightly thicker than metatibiae. Abdomen with hardly visible punctulate microsculpture, sternite 1 humped mediobasally, appearing impunctate except for coarse punctures margining submetacoxal lines.

♂: Protarsomeres I to III distinctly widened, much narrower than apices of tibiae, not lobed. Aedeagus (Figs. 16–18) 0.51–0.57 mm long, median lobe with wide, blunt apex in dorsal view, narrow and weakly inflexed in lateral view. Parameres narrow, lacking lobes, with apical halves of inner margins weakly sclerotized, weakly arcuate in dorsal view, in plane with median lobe and moderately widened in apical halves in lateral view. Internal sac with basal circular sclerite joined to weakly sclerotized transverse structure and two long, sinuate rods. Membranes anterior to circular sclerite very finely strigulate, becoming extremely finely denticulate more apically.

♀: Ovipositor (Fig. 19) with distal gonocoxite absent, gonostyle almost straight, narrow, with two apical setae.

Comparative notes

This species shares many diagnostic characters with *B. maculatum* Löbl, 1989 from New Guinea. It may be readily distinguished from the latter by its colour patter, the absence of mesoventral carina, the tibiae not sinuate and the parameres widened in apical halves. It is defined by the following characters in combination: Body black, antennomere XI yellowish, elytra with puncture rows in grooves, lacking humeral humps, mesoventrite lacking mesal ridge, metaventrite with few coarse punctures between and lateral to mesocoxae. Median lobe weakly inflexed apically, parameres narrow, lacking lobes, arcuate in dorsal view. Internal sac with circular basal sclerite and two long rods.

3.3 New species of *Scaphisoma* Leach, 1815

Scaphisoma perminutum **n. sp.**
(Figs. 20–23)

Holotype ♂: Moluccas, Ternate Island, Marikurubu, Gn. Gamalama, 700–1500 m, 29.X.1999, leg. A. Riedel (SMNS).

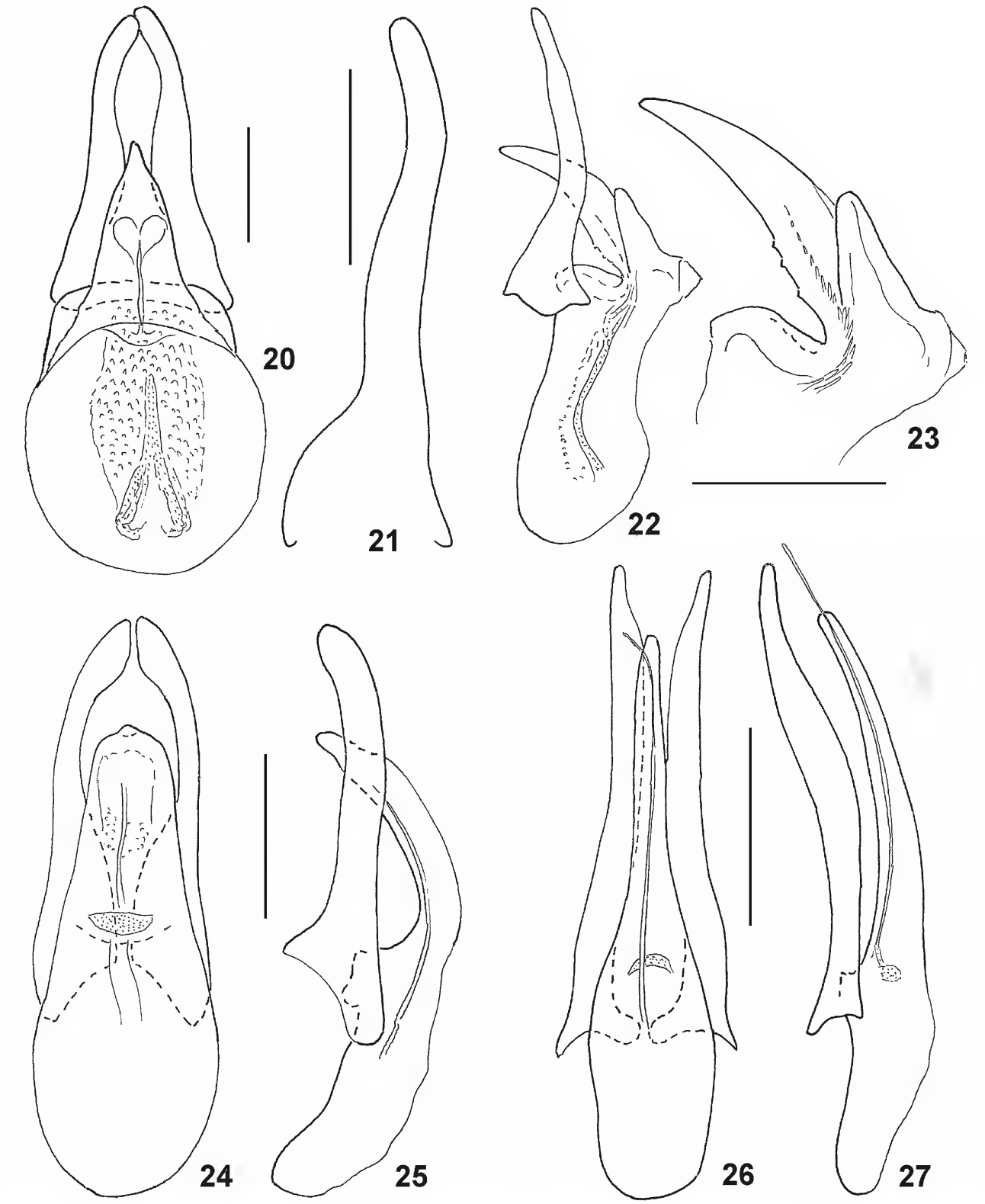
Paratypes: 3 ♂♂, 3 ♀♀, with the same data as the holotype (SMNS, MHNG).

Etymology

The species epithet is formed by the Latin "per" meaning strong, much, and "minutum" meaning small.

Description

Body length 0.98–1.05 mm, width 0.68–0.72 mm. Head, most of body and appendages yellowish-brown, elytra each with fairly well delimited dark brown basal and subapical fasciae, mesoventrite and metaventrite darkened. Basal elytral fascia at middle about as one fifth of sutural length, broadened toward suture. Apical elytral fascia about as broad as middle part of basal fascia, separated from apical margins by very narrow light area. Dorsum of body not microsculptured and not iridescent. Antennae long, relative length/width of antennomeres as: III 13/6: IV 20/5: V 33/5: VI 27/6: VII 38/10: VIII 30/7: IX 38/10: X 37/10: XI 48/11. Pronotum very finely punctate, with lateral margins evenly rounded, lateral margin carinae entirely visible in dorsal view. Exposed tip of scutellum minute. Elytra with lateral margin carinae entirely or almost entirely visible in dorsal view, apical margins weakly rounded, inner apical angles not prominent, situated somewhat posterior to level of outer angles; sutural margin not raised, sutural striae deep, bent at base, not extending along basal margin, weakly converging toward



Figs. 20–27. *Scaphisoma* spp., genitalia. □ **20–23**. *S. perminutum* n. sp., aedeagus in dorsal (20) and lateral (22) views, paramere in dorsal view (21), apical part of median lobe (23). □ **24**, **25**. *S. perleve* n. sp., aedeagus in dorsal (24) and lateral (25) views. □ **26**, **27**. *S. persimilans* n. sp., aedeagus in dorsal (26) and lateral (27) views. – Scale-bars: 0.05 mm (20–23), 0.1 mm (24–27).

apices; adsutural areas flat, densely and finely punctate. Elytral punctation dense and fairly coarse, puncture intervals mostly about as large as to twice as large as puncture diameters. Hind wings fully developed. Hypomera smooth. Mesepimeron about three times as long as interval to mesocoxa, four times as long as wide. Metaventrite not microsculptured, in the middle slightly convex, lacking mesal or apicomesal impressions or striae, punctation on most surface very fine and sparse, becoming denser and less fine near apical process and posterior to submesocoxal lines, with dense antecoxal puncture row in somewhat impressed line. Submesocoxal areas 0.04 mm, almost as half of interval to metacoxa, submesocoxal lines convex, distinctly punctate. Metanepisternum flat, narrowed anteriad, inner margin oblique, rounded near angles, not impressed below margin of metaventrite. Protibiae and metatibiae straight, mesotibiae slightly bent. Abdomen with strigulate microsculpture, very finely punctate, submetacoxal areas 0.05 mm, almost as half of interval to apical margin of sternite 1, submetacoxal lines convex, distinctly punctate.

♂: Protarsomeres I to III distinctly widened. Aedeagus (Figs. 20–23) 0.22–0.25 mm long, symmetrical, with basal bulb weakly sclerotized, except for its apical side strongly sclerotized and prominent. Articular process robust, not prominent. Apical process of median lobe bifid. Ventral branch of apical process strongly inflexed, tapering, with several ventral tooth-like tubercles. Dorsal branch of apical process fissured mesally. Parameres sinuate and strongly widened basally in both, dorsal and lateral views, pores sparse, not grouped. Internal sac with proximally bifurcate rod, membranes with minute scale-like structures in basal half, with spine-like structure in apical half.

Comparative notes

The aedeagus of *S. perminutum* is similar to that in *S. napu* Löbl, 1983 from Sulawesi. In particular, these species share the strongly inflexed and ventrally tuberculate apical process of the median lobe. The new species may be distinguished by the elytra darkened along basal margins, the sutural striae of the elytra not shortened, the male sternite 5 simple, the apex of the median lobe thicker, the parameres strongly widened basally, and the internal sac with a proximally bifurcate rod.

Comments

The single female reported from Tanimbar (Löbl 2014a) is likely conspecific.

Scaphisoma perleve **n. sp.**
(Figs. 24, 25)

Holotype ♂: Moluccas, Halmahera Island, Ibu, Kamp. Baru, Gn. Alon, 25.XI.1999, 800 m, leg. A. Riedel (SMNS).

Etymology

The species epithet is a Latin adjective meaning very weak.

Description

Body length 1.20 mm, width 0.80 mm. Head, most of body, and appendages reddish-brown, tarsi and antennae slightly lighter than body. Elytra as dark as pronotum along basal margins, but not so near sutural striae, each elytron with large central dark spot and small dark spot at middle of apex. Surfaces anteriorly and posteriorly, and lateral central spot lighter than pronotum. Pronotum and elytra not microsculptured and not iridescent. Antennae long, relative length/width of antennomeres as: III 10/7: IV 28/67: V 29/7: VI 34/8: VII 42/12: VIII 40/10: IX 45/12: X 45/12: XI 52/13. Pronotum very finely punctate, with lateral margins evenly rounded, lateral margin carinae entirely visible in dorsal view. Tip of scutellum exposed. Elytra with lateral margin carinae almost entirely visible in dorsal view, apical margins weakly rounded, inner apical angles not prominent, situated somewhat posterior to level of outer angles; sutural margin not raised, sutural striae deep, bent at base, not extending along basal margin, parallel posterior to scutellum; adsutural areas flat, densely and finely punctate. Elytral punctation as fine or almost as fine as pronotal punctation on basal third, dense and fairly coarse posterior to basal third, with puncture intervals mostly about as large as to twice as large as puncture diameters. Hind wings fully developed. Hypomera smooth. Mesepimeron about 1.5 times as long as interval to mesocoxa, four times as long as wide. Sides of metaventrite not microsculptured, appearing impunctate, antecoxal puncture rows absent; middle part of metaventrite somewhat convex, with strigulate microsculpture, hardly visible punctation, two minute, shallow apicomesal impressions. Submesocoxal areas 0.02 mm, about as one fifth of interval to metacoxa, submesocoxal lines parallel, finely punctate. Metanepisternum almost flat, narrowed anteriad, inner margin oblique, rounded near angles, distinctly impressed below margin of metaventrite. Tibiae straight. Abdomen with strigulate microsculpture, very finely punctate, submetacoxal areas 0.04 mm, about as one third of interval to apical margin of sternite 1; submetacoxal lines convex, distinctly punctate.

♂: Protarsomeres I to III and mesotarsomeres I and II distinctly widened. Aedeagus (Figs. 24, 25) 0.35 mm long, symmetrical, moderately sclerotized. Median lobe gradually narrowed apically in dorsal view, with articular process fairly robust, not prominent, apical process somewhat shorter than basal bulb, almost evenly curved in lateral view, narrowed at apex, tip blunt. Parameres wide in basal part, gradually narrowed to apical fourth, at apex widened and with truncate inner margin in dorsal view, almost evenly wide posterior to base and curved in apical third in lateral view; pores fairly dense in apical part. Internal sac

with membranous tube surrounding flagellum sclerotized and with moderately transversal piece, membranes in apical half very densely and finely denticulate.

Comparative notes

The aedeagal characters suggest relationship with *S. aequum* Löbl, 2015 and *S. aereum* Löbl, 2015 from the Lesser Sundas, though *S. perleve* has the median lobe and parameres symmetrical, the apical process of the median lobe moderately bent and the internal sac possesses a transverse piece. The new species is much smaller than *S. aequum* and *S. aereum*, and differs from them notably by the metaventrite lacking a median groove. See also comments under *S. persimilans*.

Scaphisoma persimilans **n. sp.**
(Figs. 26, 27)

Holotype ♂: Moluccas, Halmahera Island, Sidangoli, Batu putih, 23.XI.1999, 100 m, leg. A. Riedel (SMNS).

Paratypes: 2♂♂, with the same data as the holotype (SMNS, MHNG); 1 ♀, Moluccas, Ternate Island, Marikurubu, Gn. Gamalama, 700–1500 m, 29.X.1999, leg. A. Riedel (SMNS).

Etymology

The species epithet is formed by the Latin "per" meaning strong, much, and "simile" meaning similar.

Description

Body length 1.15–1.20 mm, width 0.82–0.84 mm. Head and most of body light reddish-brown, elytra each with dark basal spot, dark postmedian spot and narrowly darkened apex. Basal spot covers basal fourth of inner two thirds of basal width. Postmedian spot larger than basal spot, extending from mid-length to apical fourth of elytron and to sutural stria, separated from lateral stria by a narrow light stripe. Ventral side of thorax darkened, brown. Abdomen yellowish or yellowish-brown, eventually with slightly darkened sternite 1 and darkened apical part of pygidium. Appendages light, yellowish-brown. Dorsum of body not microsculptured and not iridescent. Antennae long, relative length/width of antennomeres as: III 10/8: IV 20/7: V 31/7: VI 30/7: VII 43/11: VIII 31/8: IX 53/9: X 52/10: XI 73/12. Pronotum very finely punctate, with lateral margins evenly rounded, lateral margin carinae hardly visible in dorsal view. Scutellum concealed. Elytra with lateral margin carinae entirely visible in dorsal view, apical margins rounded, inner apical angles not prominent, situated about in level with outer angles; sutural margin not raised, sutural striae deep, bent near base, not extending along basal margin, parallel toward apices; adsutural areas flat, very finely punctate. Elytral punctation sparse and very fine, almost as fine as pronotal punctation, slightly larger punctures on apical third of disc. Hind wings fully developed. Hypomera smooth. Mesepimeron about 1.5 times as long as interval to mesocoxa, three times as long as wide. Metaventrite not microsculptured, convex in the middle, with two shallow apicomesal impressions, punctation very fine and dense, hardly visible, antecoxal puncture rows absent. Submesocoxal areas 0.05 mm, almost as half of interval to metacoxa, submesocoxal lines convex, very finely punctate. Metanepisternum almost flat, narrowed anteriad, inner margin oblique, rounded near angles, distinctly impressed below margin of metaventrite. Tibiae straight. Abdomen not microsculptured, very finely punctate, submetacoxal areas 0.07 mm, somewhat shorter than interval to apical margin of sternite 1; submetacoxal lines convex, indistinctly punctate.

♂: Protarsomeres I to III distinctly widened. Aedeagus (Figs. 26–27) 0.32–0.35 mm long, symmetrical, moderately sclerotized. Median lobe very narrow and strongly elongate, with basal bulb only somewhat longer than half of apical process. Articular process small, not prominent. Apical process almost in plane with basal bulb, with weakly convace ventral side (lateral view). Parameres sinuate, widest in middle third, narrowed in apical part, with scattered pores. Internal sac simple, with flagellum and small transverse plate situated somewhat anterior to level of parameral bases.

Comparative notes

The aedeagal characters of this new species suggest relationship with *S. perbrincki* Löbl, 1971 from Sri Lanka and *S. sakaii* Löbl, 1988 from Okinawa. The aedeagus differs, however, notably by the parameres narrowed apically. This new species may be readily distinguished from both by the light reddish-brown body, the antennomere IV twice as long as III, and from *S. perbrincki* by the much smaller submetacoxal areas. In addition, it differs drastically by its colour pattern combined with the finely punctate elytra. Both, *S. persimilans* and *S. perleve*, are unique in possessing a transverse sclerotized piece in the basal section of the internal sac.

Scaphisoma perfectum **n. sp.**
(Figs. 28, 29)

Holotype ♂: Moluccas, Morotai Island, W Daruba, Raja, 16.–19.XI.1999, 100 m, leg. A. Riedel (SMNS).

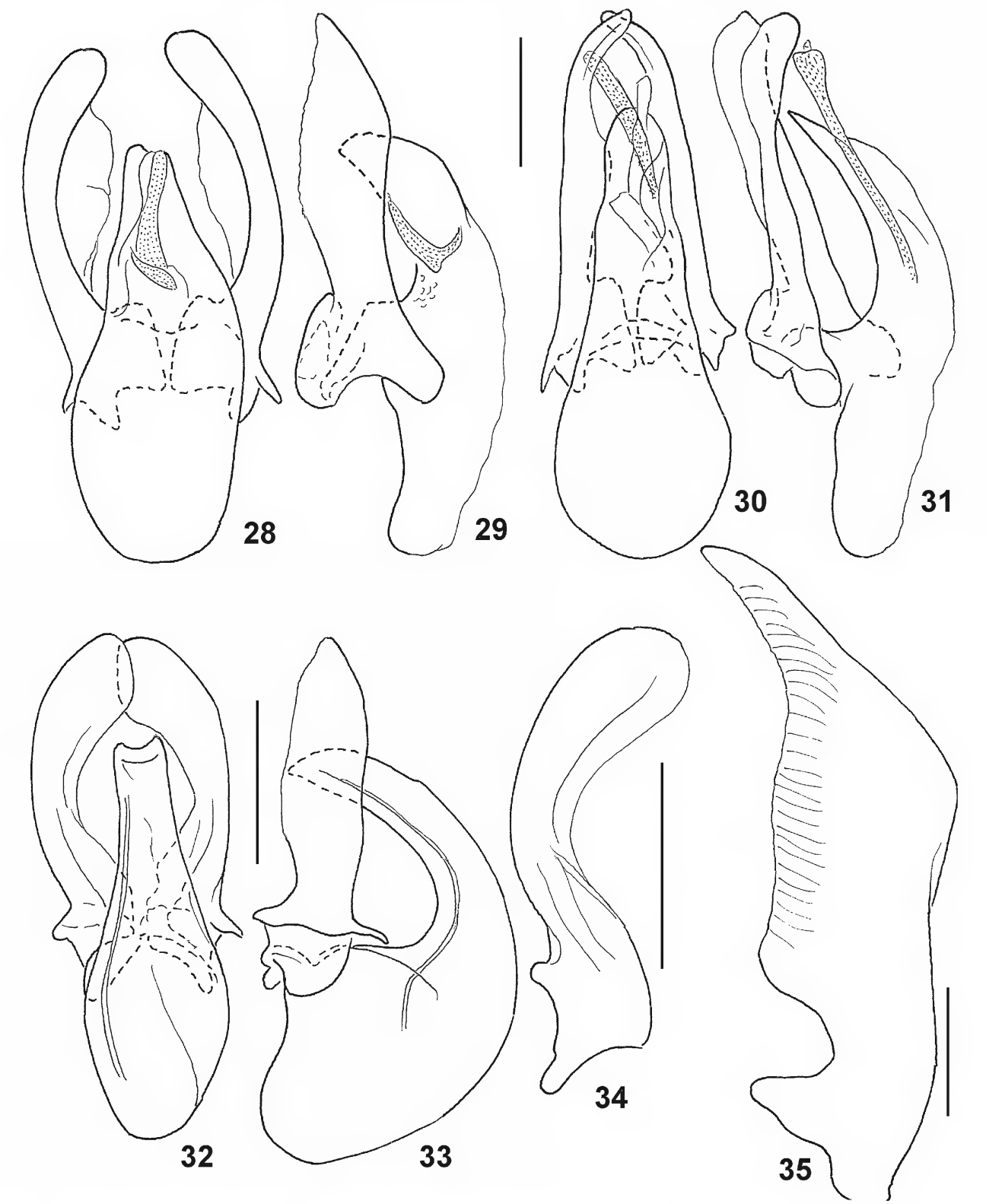
Paratypes: 1♂, 2♀♀, with the same data as the holotype (SMNS, MHNG).

Etymology

The species epithet is a Latin adjective meaning perfect.

Description

Body length 1.80–1.90 mm, width 1.15–1.32 mm. Head and body dark brown, apical margins of elytra and appendages lighter. Dorsum of body not microsculptured



Figs. 28–35. *Scaphisoma* spp., genitalia. □ **28**, **29**. *S. perfectum* n. sp., aedeagus in dorsal (28) and lateral (29) views. □ **30**, **31**. *S. perturbator* n. sp. , aedeagus in dorsal (30) and lateral (31) views. □ **32–34**. *S. permutatum* n. sp., aedeagus in dorsal (32) and lateral (33) views, paramere in ventral view (34). □ **35**. *S. peraffirmatum* n. sp., paramere in lateral view. – Scale-bars: 0.1 mm.

and not iridescent. Antennae long, relative length/width of antennomeres as: III 15/8: IV 34/7: V 40/7: VI 40/8: VII 42/14: VIII 36/7: IX 45/13: X 45/14: XI 62/16. Pronotum very finely and densely punctate, with lateral margins evenly rounded, lateral margin carinae concealed in dorsal view. Tip of scutellum exposed. Elytra with lateral margin carinae concealed in dorsal view, apical margins rounded, inner apical angles not prominent, situated about in level with outer angles; sutural margin not raised, sutural striae shallow, bent along pronotal lobe, extending along basal margin to form basal striae reaching beyond basal mid-width, parallel toward apices; adsutural areas flat, very finely punctate. Elytral punctation dense and very fine, on basal halves about as fine as pronotal, somewhat less fine on apical halves, with puncture intervals mostly two to three times as large as puncture diameters. Hind wings fully developed. Hypomera smooth. Mesepimeron shorter than interval to mesocoxa, about twice as long as wide. Metaventrite not microsculptured, flattened apicomesally, lacking mesal or apicomesal impressions or striae, punctation on most surface very fine, on median part denser than on lateral parts, antecoxal puncture rows absent. Submesocoxal areas 0.03 mm, as one fifth of interval to metacoxa, submesocoxal lines parallel, very finely punctate. Metanepisternum flat, narrowed anteriad, inner margin oblique, rounded at anterior angle, in level with margin of metaventrite. Tibiae straight. Abdomen with strigulate microsculpture, very finely punctate, submetacoxal areas hardly 0.05–0.06 mm, about as one third of interval to apical margin of sternite 1; submetacoxal lines convex, indistinctly punctate.

♂: Protarsomeres I to III distinctly widened. Aedeagus (Figs. 28, 29) 0.42–0.43 mm long, median lobe fairly sclerotized, asymmetrical. Basal bulb fairly wide and comparatively flat. Articular process robust, not prominent. Apical process weakly inflexed, much shorter than basal bulb, with blunt apex, irregularly narrowed in dorsal view, with asymmetrical dorsal valve. Parameres symmetrical, with ventrally and dorsally expanded bases, in dorsal view arcuate, in lateral view almost in plane with median lobe, each with inner membranous lobe; pores scattered. Internal sac with sclerotized rod bearing basal anchor-like apophysis.

Comparative notes

The aedeagal characters suggest relationship with *S. triste* Löbl, 1975 from New Guinea, though the parameres are asymmetrical and strongly expanded basally. This new species may be readily distinguished by: Body smaller, 1.80–1.90 mm long, very finely punctate. Antennomere XI about 1.4 times as long as X and four times as long as wide. Elytra with basal striae extending beyond basal mid-width. Abdomen microsculptured. Submesocoxal lines parallel, submetacoxal lines convex, submetacoxal areas much smaller. Median lobe asymmetrical, basal bulb longer than apical process of median lobe, parameres with bases expanded ventrally and dorsally, and with membranous inner lobes, internal sac with sclerotized rod.

Scaphisoma perturbator **n. sp.**

(Figs. 30, 31)

Holotype ♂: Moluccas, Ternate Island, Marikurubu, Gn. Gamalama, 300–600 m, 28.X.1999, leg. A. Riedel (SMNS).

Paratype: 1♀, with the same data as the holotype (MHNG).

Etymology

The species epithet is a Latin noun meaning disturber, upsetter.

Description

Body length 1.70 mm, width 1.22 mm. Head and body dark brown, apical margins of elytra, apex of abdomen and appendages lighter. Dorsum of body not microsculptured and not iridescent. Antennae fairly long, relative length/width of antennomeres as: III 15/9: IV 25/8: V 36/8: VI 35/10: VII 46/16: VIII 34/12: IX 47/15: X 45/15: XI 53/15. Pronotum very finely and densely punctate, with lateral margins evenly rounded, lateral margin carinae concealed in dorsal view. Tip of scutellum exposed. Elytra with lateral margin carinae concealed in dorsal view, apical margins rounded, inner apical angles not prominent, situated about in level with outer angles; sutural margin not raised, sutural striae shallow, parallel toward apices, bent along pronotal lobe, extending along basal margin to form basal striae almost reaching basal mid-width; adsutural areas flat, very finely punctate. Elytral punctation dense and very fine, about as fine as pronotal on basal halves, somewhat less fine on apical halves, with puncture intervals mostly two to four times as large as puncture diameters. Hind wings fully developed. Hypomera smooth. Mesepimeron much shorter than interval to mesocoxa, about twice as long as wide. Metaventrite not microsculptured, weakly convex in the middle, with two shallow, not clearly delimited apicomesal impressions, very finely and sparsely punctate; antecoxal puncture rows absent. Submesocoxal areas 0.03 mm, as one fifth of interval to metacoxa, submesocoxal lines parallel, indistinctly punctate. Metanepisternum flat, hardly narrowed anteriad, inner margin straight, somewhat rounded at anterior angle, below level of margin of metaventrite. Tibiae straight. Abdomen with strigulate microsculpture, very finely punctate, submetacoxal areas hardly 0.05–0.06 mm, about as one third of interval to apical margin of sternite 1; submetacoxal lines convex, indistinctly punctate.

♂: Protarsomeres I to III distinctly widened. Aedeagus (Figs. 30, 31) 0.42 mm long, asymmetrical. Median lobe fairly sclerotized. Basal bulb fairly wide and com-

paratively flat. Articular process robust, not prominent. Apical process weakly inflexed, with asymmetrical dorsal valves, longer than basal bulb, tapering and with acute tip in lateral view, apex blunt and irregularly narrowed in dorsal view. Parameres asymmetrical, with ventrally and dorsally expanded bases, each with inner membranous lobe, oblique except at curved apices in dorsal view, almost in plane with median lobe in lateral view, right paramere narrowed in the middle and bent dorsally at apex; pores scattered in basal halves. Internal sac with long sclerotized rod, membranes lacking scale-like or denticulate structures.

Comparative notes

This species appears to be related, and is in external characters very similar, to *S. perfectum*, with which it shares expanded parameral bases. It may be distinguished by: Body smaller, 1.70 mm long; antennomere XI about 3.5 times as long as wide and 1.2 times as long as X; elytra with basal striae shorter, not reaching basal midwidth; parameres asymmetrical, lacking large inner lobes, right paramere narrowed in the middle and bent dorsally at apex; internal sac with long rod widened at apex.

Scaphisoma permutatum **n. sp.**
(Figs. 32–34)

Holotype ♂: Moluccas, Halmahera Island, 28 km S Tobelo, 23.XI.1999, 100 m, leg. A. Riedel (SMNS).

Paratypes: 2♂♂, 2♀♀, with the same data as the holotype (SMNS, MHNG).

Etymology

The species epithet is formed by the Latin "per", here in sense of strongly, and the adjective "mutatum" meaning different, changed.

Description

Body length 1.05–1.17 mm, width 0.76–0.81 mm. Head, most of body and appendages yellowish-brown or light brown-reddish, middle part of each elytron with broad, dark brown to black transverse fascia, apical third of elytra, antennae, tibiae, and tarsi lighter than head, pronotum or basal fifth to fourth of elytra. Dark elytral fascia reaching sutural stria and almost reaching lateral stria, covering about two thirds of elytral disc, with irregular anterior and posterior margins. Dorsum of body not microsculptured and not iridescent. Antennae fairly short, relative length/width of antennomeres as: III 10/6: IV 23/5: V 28/5: VI 25/6: VII 36/9: VIII 25/8: IX 35/12: X 35/12: XI 37/14. Pronotum very finely punctate, with lateral margins evenly rounded, lateral margin carinae hardly visible in dorsal view. Tip of scutellum exposed. Elytra with lateral margin carinae entirely or almost entirely visible in dorsal view, apical margins truncate, inner apical angles not prominent, situated about in level with outer angles; sutural margin not raised, sutural striae shallow, bent along pronotal lobe, not extending along basal margin, parallel toward apices; adsutural areas flat, very finely punctate. Elytral punctation sparse and very fine, about as fine as pronotal punctation on light basal and apical areas, less fine on dark fascia, with puncture intervals mostly three to five times as large as puncture diameters. Hind wings fully developed. Hypomera smooth. Mesepimeron somewhat longer than interval to mesocoxa, almost four times as long as wide. Metaventrite not microsculptured, flattened apicomesally, lacking mesal or apicomesal impressions or striae, punctation on most surface very fine and sparse, denser and less fine near apical process, antecoxal puncture rows absent. Submesocoxal areas 0.04 mm, as half of interval to metacoxa, submesocoxal lines convex, very finely punctate. Metanepisternum almost flat, narrowed anteriad, inner margin oblique, rounded near angles, hardly impressed below margin of metaventrite. Tibiae straight. Abdomen not microsculptured, very finely punctate, submetacoxal areas hardly 0.03 mm, about as one third of interval to apical margin of sternite 1; submetacoxal lines subparallel, indistinctly punctate.

♂: Protarsomeres I to III distinctly widened. Aedeagus (Figs. 32–34) 0.33 mm long, median lobe moderately sclerotized, asymmetrical. Basal bulb narrow and high. Articular process indistinct. Apical process strongly inflexed, tubular, with blunt apex. Parameres symmetrical, arcuate in dorsal view, straight in lateral view, with complex bases, weakly sclerotized inner sides; pores very dense, covering most surfaces, absent from basal parts and areas along outer margins. Internal sac with very narrow flagellum, membranes appearing papillate.

Comparative notes

This new species shares with *S. perfectum* and *S. perturbator* expanded parameral bases, and with *S. perleve* and *S. persimilans* the presence of a long, thin flagellum. It may be distinguished by the finely punctate elytra with a dark transverse central band, the parallel submesocoxal lines and the subparallel submetacoxal lines, in combination.

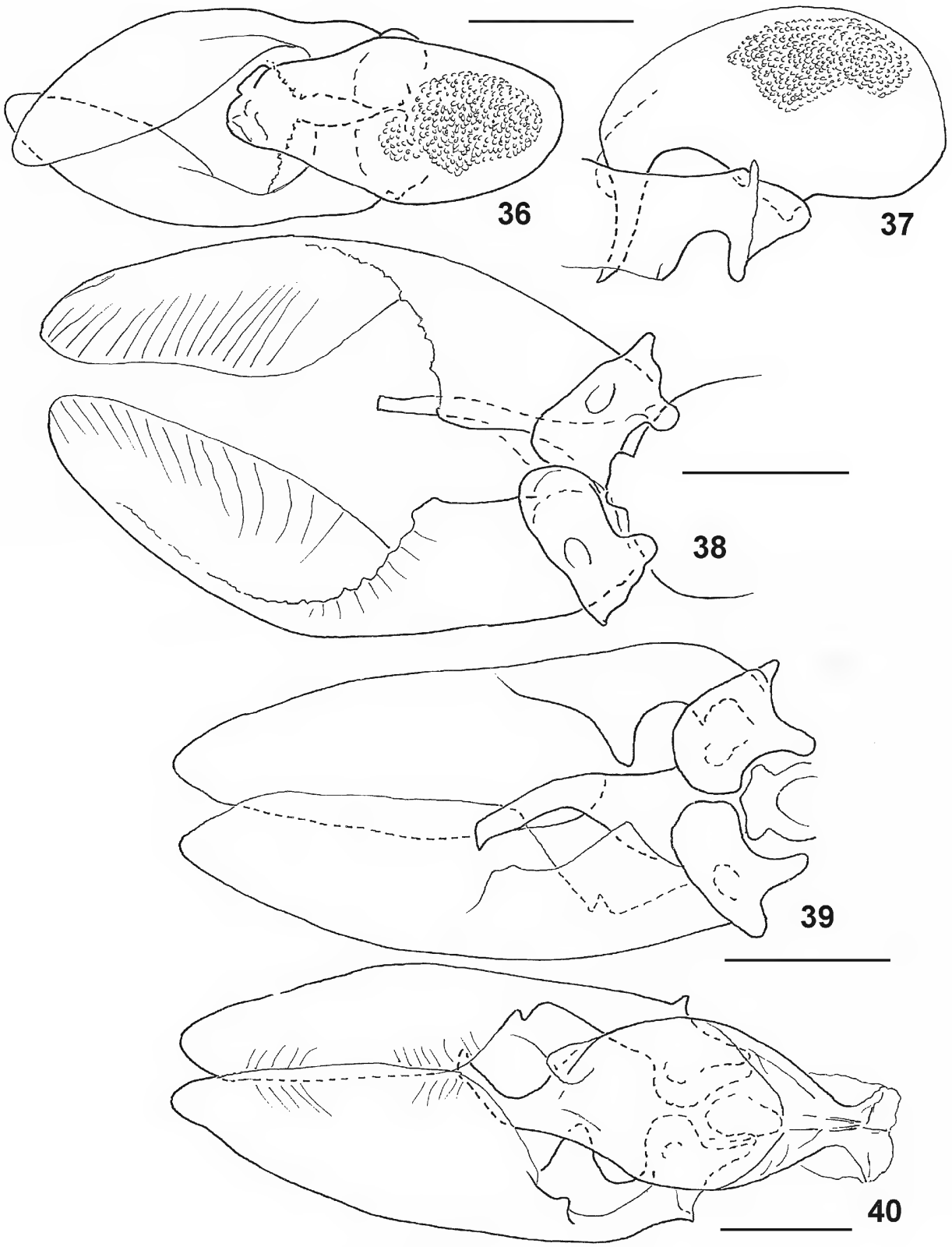
Scaphisoma peraffirmatum **n. sp.**
(Figs. 35–38)

Holotype ♂: Moluccas, Halmahera Island, 28 km S Tobelo, Togoliua, 2.XI.1999, ca. 200 m, leg. A. Riedel (SMNS).

Paratypes: 7♂♂, 3♀♀, with the same data as the holotype (SMNS, MHNG).

Etymology

The species epithet is formed by the Latin "per", here meaning strongly, and "affirmatum" meaning making sure, secure.



Figs. 36–40. *Scaphisoma* spp., genitalia. □ **36–38**. *S. peraffirmatum* n. sp., aedeagus in dorsal view (36), in lateral view, without apical part of paramere (37), in ventral view, without basal part of bulb and internal sac (38). □ **39**, **40**. *S. perdecorum* n. sp., aedeagus in ventral view, without basal bulb (39), in dorsal view (40). – Scale-bars: 0.2 mm (36, 37, 39, 40), 0.1 mm (38).

Description

Body length 1.23–1.32 mm, width 0.87–0.96 mm. Head and most of body light reddish-brown to yellowish-brown, or pronotum dark brown, middle part of elytra with wide, dark brown to black transverse fascia; apical third of elytra, most of abdomen, and appendages lighter than head, pronotum or basal fifth to fourth of elytra. Mesoventrite, metaventrite and sternite 1 darkened. Dark elytral fascia reaching both, sutural and lateral striae, covering about two thirds of elytral disc, with irregular anterior and posterior margins. Body not microsculptured and not iridescent. Antennae fairly short, relative length/width of antennomeres as: III 7/6: IV 27/6: V 30/7: VI 30/6: VII 37/10: VIII 25/7: IX 39/12: X 36/12: XI 39/12. Pronotum very finely punctate, with lateral margins evenly rounded, lateral margin carinae visible in dorsal view. Tip of scutellum exposed. Elytra with lateral margin carinae entirely or almost entirely visible in dorsal view, apical margins truncate, inner apical angles not prominent, situated about in level with outer angles; sutural margin not raised, sutural striae shallow, bent along pronotal lobe, not extending along basal margin, posterior to scutellum parallel except near apices; adsutural areas flat, very finely punctate. Elytral punctation dense and fairly coarse, much coarser than pronotal punctation on anterior two thirds of disc, with puncture intervals mostly about as large to twice as large as puncture diameters. Punctation on light apical third of elytra much finer, with punctures about as minute as those on pronotum. Hind wings apparently fully developed. Hypomera smooth. Mesepimeron about twice as long as interval to mesocoxa, about four times as long as wide. Metaventrite not microsculptured, flattened apicomesally, lacking mesal or apicomedial impressions or striae, punctation on most surface very fine and sparse, denser and less fine near apical process, antecoxal puncture rows absent. Submesocoxal areas 0.04 mm, as half of interval to metacoxa, submesocoxal lines convex, finely punctate. Metanepisternum somewhat convex, moderately narrowed anteriad, inner margin oblique, rounded near angles, impressed below margin of metaventrite. Tibiae straight. Abdomen not microsculptured, very finely punctate, submetacoxal areas hardly 0.02 mm, less than one tenth of interval to apical margin of sternite 1; submetacoxal lines parallel, coarsely punctate.

♂: Protarsomeres I to III and mesotarsomeres I and II strongly widened, protarsomeres III moderately widened; tarsomeres I about as wide as tibial apices. Aedeagus (Figs. 35–38) 0.64–0.69 mm long, median lobe strongly sclerotized, asymmetrical. Basal bulb narrow and high. Articular process distinct, not prominent. Apical process strongly inflexed, tapering, with acute apex in lateral view, appearing short and blunt in dorsal view. Parameres symmetrical, with complex, strongly sclerotized bases, abruptly narrowed posterior to bases, in the middle almost evenly wide, narrowed in apical parts in lateral view; with strongly crenulate margins delimiting basal section, followed by large, partly overlapping lobes, latter finely striate in dorsal view; pores grouped to form dense fields along apical halves of outer margins. Internal sac forming compact bulb situated in basal part of median lobe, covered by scale-like and denticulate structures.

Comparative notes

This new species is possibly related with *S. bacchusi* Löbl, 1975 from New Guinea. Both have large, strongly sclerotized, asymmetrical and comparatively high median lobe of the aedeagus, and strongly widened parameres. The internal sac forms a compact bulb in *S. peraffirmatum* and, unlike that in *S. bacchusi*, lacks sclerotized pieces and large triangular plates. These two species may be readily distinguished by their elytral coloration and punctation (the elytra are black and very finely punctate in *S. bacchusi*).

Scaphisoma perdecorum **n. sp.**
(Figs. 39–41)

Holotype ♂: Moluccas, Halmahera Island, Tobelo (SW) 1.XI.1999, 850 m, A. Riedel (SMNS).

Paratypes: 2♀♀, with the same data as the holotype (SMNS, MHNG); 1 ♂, Moluccas, Halmahera Island, Ibu, Kamp. baru, Gn. Alon, 25.XI.1999, 800 m, leg. A. Riedel (MHNG).

Etymology

The species epithet is formed by the Latin "per", here in sense of strongly, and "decorum" meaning ornamented.

Description

Body length 1.40–1.48 mm, width 1.01–1.05 mm. Head and most of body very dark brown with weak reddish lustre to blackish-brown. Elytra each with subbasal, well delimited, transverse reddish fascia, extending from sutural striae up to outer fourth of basal width, separated from basal margin by narrow dark strip, and reaching middle third of disc. Apical third of elytra light reddish or yellowish; adsutural areas reddish-brown. Femora somewhat darker than apical third of elytra, antennae, tibiae and tarsi about as light as apical third of elytra. Body not microsculptured and not iridescent. Antennae fairly long, relative length/width of antennomeres as: III 9/7: IV 30/6: V 35/6: VI 35/7: VII 48/11: VIII 33/9: IX 46/14: X 46/14: XI 47/13. Pronotum very finely punctate, with lateral margins evenly rounded, lateral margin carinae visible in dorsal view. Tip of scutellum exposed. Elytra with lateral margin carinae entirely or almost entirely visible in dorsal view, apical margins truncate, inner apical angles not prominent, situated posterior to level of outer angles; sutural margin not raised, sutural striae shallow, bent along pronotal lobe, not extending along basal

margin, parallel posterior to scutellum except near apices; adsutural areas flat, very finely punctate. Elytral punctation dense and fairly coarse, much coarser than pronotal punctation, with puncture intervals mostly about as large to twice as large as puncture diameters. Punctation on light apical third of elytra finer, but still much coarser than that on pronotum. Hind wings fully developed. Hypomera smooth. Mesepimeron about as long as interval to mesocoxa, about three times as long as wide. Metaventrite not microsculptured, flattened apicomesally, lacking mesal or apicomedial impressions or striae, punctation on most of surface very fine and sparse, dense and coarse near apical process, antecoxal puncture rows absent. Submesocoxal areas 0.04 mm, about as half of interval to metacoxa, submesocoxal lines convex, coarsely punctate. Metanepisternum somewhat convex, narrowed anteriad, inner margin oblique, rounded near angles, impressed below margin of metaventrite. Tibiae straight. Abdomen not microsculptured, very finely punctate, submetacoxal areas about 0.02 mm, as one fifth of interval to apical margin of sternite 1; submetacoxal lines parallel, coarsely punctate.

♂: Protarsomeres and mesotarsomeres I and II strongly widened, tarsomeres III moderately widened; tarsomeres I narrower than tibial apices. Aedeagus (Figs. 39–41) 1.02–1.03 mm long, strongly sclerotized, asymmetrical. Basal bulb narrow and high, with basal apophysis. Articular process distinct, not prominent. Apical process strongly inflexed, bent to right side in dorsal view, tapering, with tip fairly acute in lateral view. Parameres with complex bases, abruptly widened posterior to bases, with small dorsal and large ventral teeth-like protuberances, in posterior two thirds strongly expanded and overlapping, finely striate; pores forming dense fields in apical parts, scattered in middle parts of parameres. Internal sac forming compact, elongate bulb covered by scale-like and denticulate structures.

Comparative notes

This species is allied with *S. apterum* Löbl, 2014 and *S. semibreve* Löbl, 2014, both from the Tanimbar Islands group. These three species, and the three species described below, possess a semi-hyaline process situated at the ventro-proximal side of the basal bulb of the aedeagus. The character is unknown from other congeners and is likely a synapomorphy defining a group of six Molukkan species, named here *apterum* group. These species are also similar in external characters, in particular they share parallel submetacoxal lines and very finely punctate metaventrite and abdomen. *Scaphisoma perdecorum* may be readily distinguished from *S. apterum* and *S. semibreve* by the colour pattern and the fairly coarse punctation of the elytra, the well developed hind wings, the coarse punctures anterior to apical process of the metaventrite, the apical process of the median lobe much shorter, reaching about parameral mid-length, the parameres broad posterior to bases and with crenulated margins, and the internal sac lacking robust, teeth-like sclerites. *Scaphisoma riedeli* Löbl, 2014 from New Guinea possesses a quite similar aedeagus, but lacks the ventro-proximal process of the median lobe (see Löbl 2014b).

Scaphisoma spinosum **n. sp.**
(Figs. 42, 43)

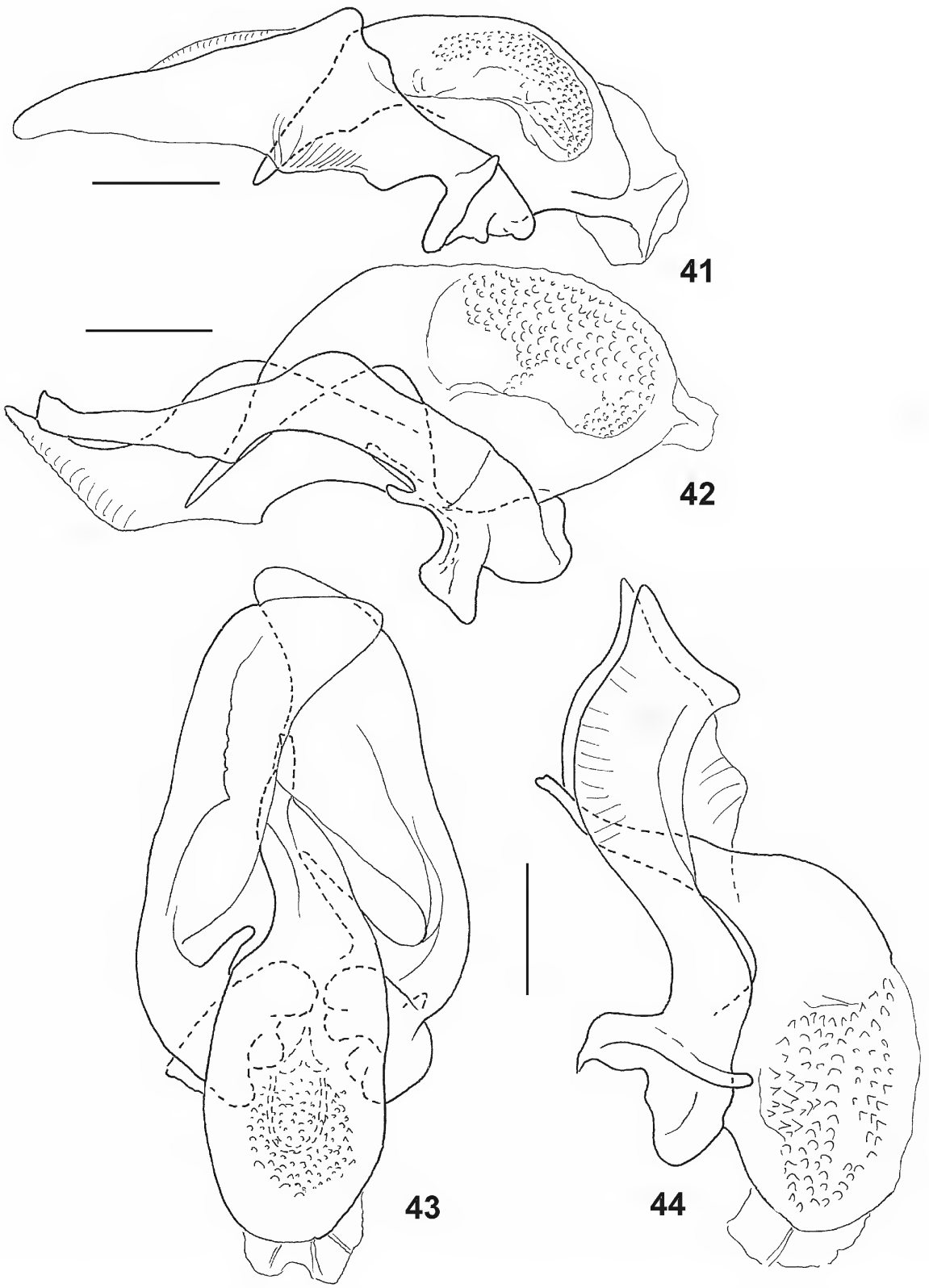
Holotype ♂: Moluccas, Halmahera Island, Sidangoli, Batu putih, 23.XI.1999, 100 m, leg. A. Riedel (SMNS).

Etymology

The species epithet is a Latin adjective referring to the presence of large parameral spines.

Description

Body length 1.25 mm, width 0.90 mm. Head, pronotum and anterior third of elytra fairly light reddish-brown. Middle third of elytra somewhat darkened, apical third of elytra lighter, yellowish. Ventral side of thorax and abdomen about as pronotum, femora slightly lighter than pronotum, antennae, tibia and tarsi almost yellowish. Body not microsculptured and not iridescent. Antennae fairly short, relative length/width of antennomeres as: III 10/7: IV 25/6: V 32/7: VI 32/6: VII 37/12: VIII 27/7: IX 37/14: X 35/14: XI 40/14. Pronotum very finely punctate, with lateral margins evenly rounded, lateral margin carinae visible in dorsal view. Tip of scutellum exposed. Elytra with lateral margin carinae entirely visible in dorsal view, apical margins truncate, inner apical angles not prominent, situated in level with outer angles; sutural margin not raised, sutural striae moderately deep, bent along pronotal lobe, not extending along basal margin, posterior to scutellum parallel except near apices; adsutural areas flat, very finely punctate. Elytral punctation dense and fairly coarse on anterior two thirds of disc, much coarser than pronotal punctation, with puncture intervals mostly about as three times as large as puncture diameters. Punctation on light apical third of elytra finer, still much coarser than that on pronotum. Hind wings fully developed. Hypomera smooth. Mesepimeron about 1.3 times as long as interval to mesocoxa, about three times as long as wide. Metaventrite not microsculptured, flattened apicomesally, lacking mesal or apicomedial impressions or striae, punctation on most surface very fine and sparse, dense and fairly coarse along apical process, antecoxal puncture rows absent. Submesocoxal areas 0.05 mm, somewhat longer than half of interval to metacoxa, submesocoxal lines convex, distinctly punctate. Metanepisternum somewhat convex, narrowed anteriad, inner margin oblique, rounded near angles, impressed below margin of metaventrite. Tibiae straight. Abdomen not microsculptured, very finely punctate, submetacoxal areas about 0.02 mm, about as one



Figs. 41–44. *Scaphisoma* spp., genitalia. □ **41**. *S. perdecorum* n. sp., aedeagus in lateral view. □ **42**, **43**. *S. spinosum* n. sp., aedeagus in lateral (42) and dorsal (43) views. □ **44**. *S. spatulatum* n. sp., aedeagus in lateral view. – Scale-bars: 0.2 mm (41), 0.1 mm (42–44).

seventh of interval to apical margin of sternite 1; submetacoxal lines parallel, coarsely punctate.

♂: Protarsomeres I to III weakly widened. Aedeagus (Figs. 42, 43) 0.60 mm long, strongly sclerotized, asymmetrical. Basal bulb narrow and high, with basal apophysis. Articular process robust, not prominent. Apical process strongly inflexed, bent to right side in dorsal view, tapering, with apex acute in lateral view, narrow and truncate in dorsal view. Parameres with complex bases, each with oblique subbasal spine, spine on left paramere much larger than that on right paramere. Both parameres lobed and overlapping apically, with crenulate ventral ridge, finely striate; pores grouped to form dense fields in apical parts, scattered in middle and basal parts of parameres. Internal sac forming compact bulb covered by scale-like and denticulate structures.

Comparative notes

This species is in external characters very similar to *S. peraffirmatum* and *S. perdecorum* from which it may be distinguished by the shape of the parameres and of the apical process of the median lobe. The large spine on the left paramere and the smaller spine on the right paramere are diagnostic.

Scaphisoma spatulatum **n. sp.**
(Figs. 44, 45)

Holotype ♂: Moluccas, Halmahera Island, Sidangoli, Batu putih, 23.XI.1999, 100 m, leg. A. Riedel (SMNS).

Etymology

The species epithet is a Latin adjective referring to the spatulate shape of the parameres.

Description

Body length 1.26 mm, width 0.88 mm. Head, pronotum and anterior third of elytra fairly light reddish-brown. Middle third of elytra somewhat darkened, apical third of elytra lighter, yellowish. Ventral side of thorax about as light as pronotum, abdominal sternite 1 almost as pronotum, following sternites lighter, femora slightly lighter than pronotum, antennae, tibia and tarsi almost yellowish. Body not microsculptured and not iridescent. Antennae fairly short, relative length/width of antennomeres as: III 8/8: IV 23/6: V 29/7: VI 28/7: VII 40/10: VIII 26/8: IX 37/12: X 42/12: XI 42/12. Pronotum very finely punctate, with lateral margins evenly rounded, lateral margin carinae visible in dorsal view. Tip of scutellum exposed. Elytra with lateral margin carinae entirely visible in dorsal view, apical margins truncate, inner apical angles not prominent, situated in level with outer angles; sutural margin not raised, sutural striae moderately deep, bent along pronotal lobe, not extending along basal margin, parallel posterior to scutellum except near apices; adsutural areas flat, very finely punctate. Elytral punctation dense and fairly coarse on anterior two thirds of disc, much coarser than pronotal punctation, with puncture intervals mostly about 1.5 to three times as large as puncture diameters. Punctation on light apical third of elytra finer, but still much coarser than that on pronotum. Hind wings apparently fully developed. Hypomera smooth. Mesepimeron about 1.4 times as long as interval to mesocoxa, about three times as long as wide. Metaventrite not microsculptured, flattened apicomesally, lacking mesal or apicomedial impressions or striae, punctation on most surface very fine and sparse, dense and fairly coarse anterior to apical process, antecoxal puncture rows absent. Submesocoxal areas 0.03 mm, somewhat longer than third of interval to metacoxa, submesocoxal lines hardly convex, indistinctly punctate. Metanepisternum somewhat convex, narrowed anteriad, inner margin oblique, rounded near angles, impressed below margin of metaventrite. Tibiae straight. Abdomen not microsculptured, very finely punctate, submetacoxal areas about 0.01 mm, about as 1/15 of interval to apical margin of sternite 1; submetacoxal lines parallel, coarsely punctate.

♂: Protarsomeres I and II distinctly widened, III weakly widened. Mesotarsomeres I distinctly widened. Aedeagus (Figs. 44, 45) 0.65 mm long, strongly sclerotized, asymmetrical. Basal bulb narrow and high, with basal apophysis. Articular process robust, not prominent. Apical process strongly inflexed, bent to left side, narrowed toward apical section, with apex slightly widened in lateral view, distinctly widened and obliquely truncate in dorsal view. Parameres asymmetrical, with complex bases, lacking spines, apically lobed. Left paramere wider than right one, lobed almost from mid-length, with crenulate ventral ridge, ventral ridge of left paramere hardly crenulate; parameral lobes finely striate, pores forming dense fields in apical parts, scattered in middle and basal parts of parameres. Internal sac forming compact bulb covered by scale-like and denticulate structures.

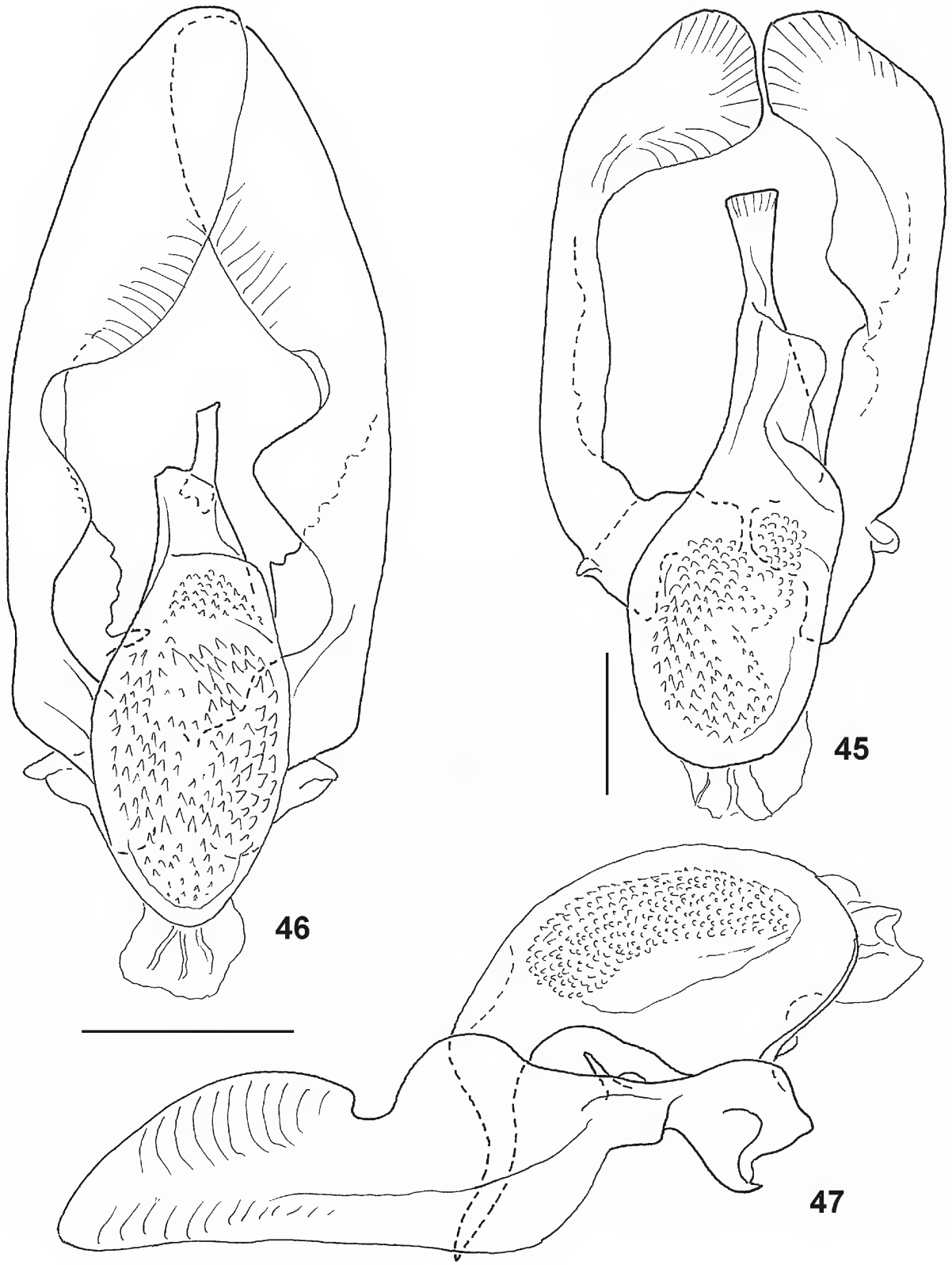
Comparative notes

This species is closely related with and very similar to *S. perdecorum* and *S. spinosum*, it differs however drastically by the longer and at the tip widened apical process of the median lobe and by the shape of the parameres, as on Figs. 44 and 45.

Scaphisoma permixtum **n. sp.**
(Figs. 46, 47)

Holotype ♂: Moluccas, Halmahera Island, 28 km S Tobelo, Togoliua, 2.XI.1999, ca. 200 m, leg. A. Riedel (SMNS).

Paratypes: 4♂♂, 5♀♀, with the same data as the holotype (SMNS, MHNG).



Figs. 45–47. *Scaphisoma* spp., genitalia. □ **45**. *S. spatulatum* n. sp., aedeagus in dorsal view. □ **46**, **47**. *S. permixtum* n. sp., aedeagus in dorsal (46) and lateral (47) views. – Scale-bars: 0.1 mm (45), 0.2 mm (46, 47).

Etymology

The species epithet is formed by the Latin "per" in sense of strongly, and the adjective "mixtum" meaning mixed, combined.

Description

Body length 1.27–1.48 mm, width 0.93–1.06 mm. Head and most of body reddish-brown. Basal third of elytra usually somewhat lighter than pronotum, adsutural areas as pronotum; middle third of elytra darkened, dark brown to blackish, darkened area extending to sutural striae, not reaching lateral striae; apical third of elytra usually distinctly lighter than basal third, almost yellowish. Femora about as pronotum, remainder of appendages lighter. Pronotum and elytra not microsculptured and not iridescent. Antennae fairly long, relative length/width of antennomeres as: III 7/7: IV 30/7: V 35/7: VI 33/7: VII 45/11: VIII 30/9: IX 45/12: X 43/13: XI 45/15. Pronotum very finely punctate, with lateral margins evenly rounded, lateral margin carinae visible in dorsal view, except near anterior angles. Tip of scutellum exposed. Elytra with lateral margin carinae entirely or almost entirely visible in dorsal view, apical margins truncate, inner apical angles not prominent, situated slightly posterior to level of outer angles; sutural margin not raised, sutural striae shallow, bent along pronotal lobe, not extending along basal margin, parallel except near apices; adsutural areas flat, very finely punctate. Elytral punctation dense and fairly coarse, much coarser than pronotal punctation, with puncture intervals mostly about as large to twice as large as puncture diameters, near apices irregular and sparser. Hind wings fully developed. Hypomera smooth. Mesepimeron about as long as interval to mesocoxa, about three times as long as wide. Metaventrite not microsculptured, flattened apicomesally, lacking mesal or apicomedial impressions or striae, punctation on most surface very fine and sparse, dense and coarse near apical process, antecoxal puncture rows absent. Submesocoxal areas 0.04 mm, about as half of interval to metacoxa, submesocoxal lines convex, coarsely punctate. Metanepisternum flat, hardly narrowed anteriad, inner margin parallel, rounded near anterior angle, impressed below margin of metaventrite. Tibiae straight. Abdomen not microsculptured, very finely punctate, submetacoxal areas about 0.03 mm, as one fifth of interval to apical margin of sternite 1; submetacoxal lines parallel, coarsely punctate.

♂: Protarsomeres and mesotarsomeres I and II strongly widened, pro- and mesotarsomeres III moderately widened; tarsomeres I narrower than tibial apices. Aedeagus (Figs. 46, 47) 0.87–0.90 mm long, strongly sclerotized. Median lobe asymmetrical, with narrow and high basal bulb, articular process robust, not prominent, apical process long, sinuate and abruptly narrowed in distal half, tip acute in lateral view, base with ventro-proximal process consisting of weakly sclerotized, irregular plate surrounding trifid structure. Parameres lobed, overlapping in dorsal view, each with conspicuous tooth-like apophysis on inner side, near base (hardly visible in dorsal view); upper margin notched posterior to mid-length; lower margin crenulate; dense pores on large area along inner margin and at apex, scattered elsewhere, finely striate areas distinct in apical halves. Internal sac bulbous, without obvious sclerites, membranes very densely denticulate.

Comparative notes

Very similar and with most diagnostic characters as in the three previously described species. It may be readily distinguished by the parameres dorsally notched, each bearing a tooth-like apophysis. It shares with *S. perdecorum* the crenulated lower margin of the parameres and the shape of the apical process of the median lobe.

Scaphisoma peregrinum **n. sp.**
(Figs. 48–51)

Holotype ♂: Moluccas, Ternate Island, Marikurubu, Gn. Gamalama, 700–1500 m, 29.X.1999, leg. A. Riedel (SMNS).

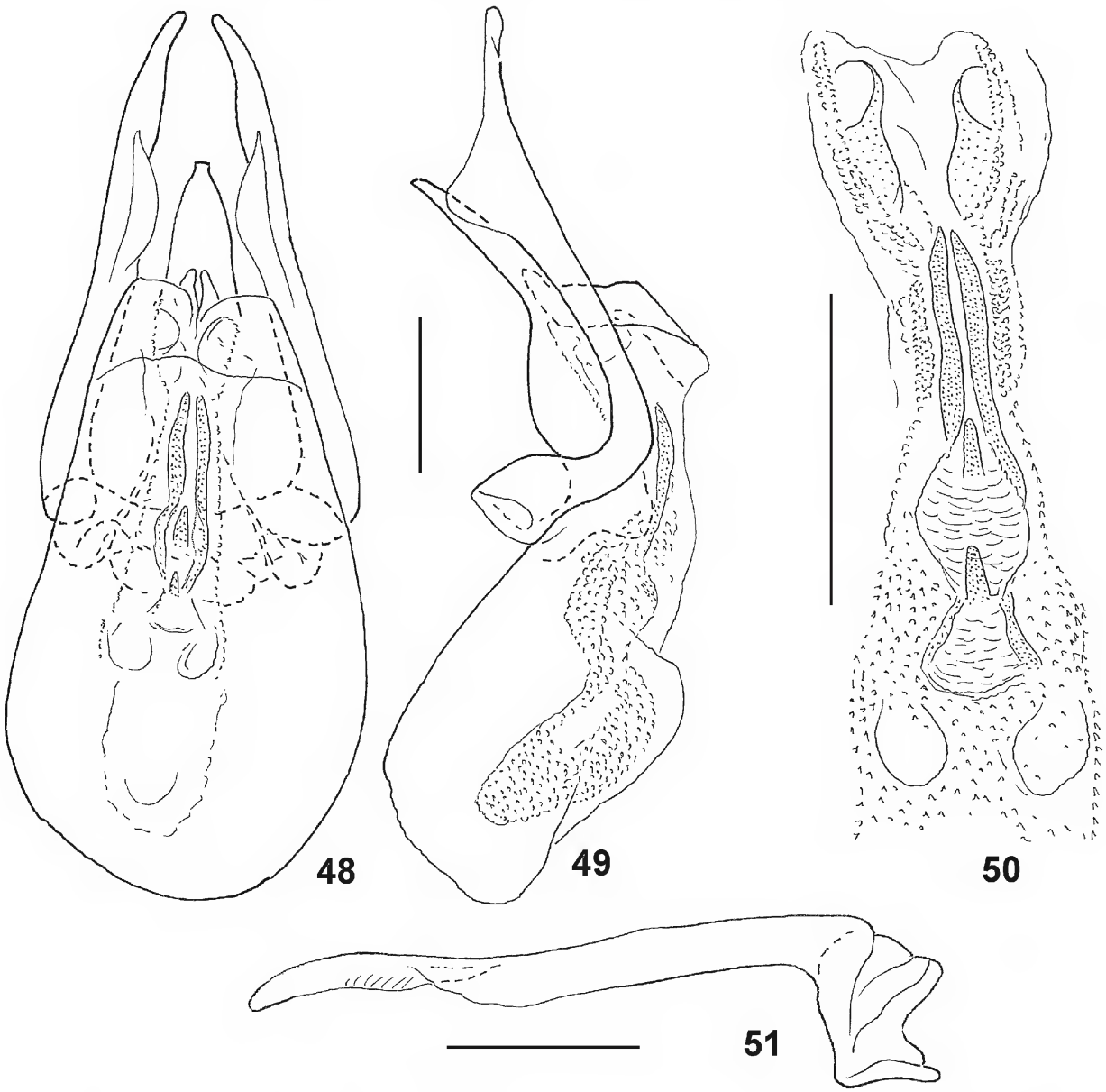
Paratypes: 2♂♂ with the same data as the holotype (SMNS, MHNG).

Etymology

The species epithet is a Latin adjective meaning strange.

Description

Body length 1.85–1.88 mm, width 1.25–1.28 mm. Head, dorsal surface of body, abdomen and femora light brown, apical parts of elytra lighter than remaining dorsal surface. Ventral side of thorax darkened. Tibiae, tarsi and antennae yellowish. Body not iridescent, thorax not microsculptured. Antennae long, relative length/width of antennomeres as: III 12/9: IV 45/7: V 65/9: VI 52/8: VII 65/151: VIII 54/8: IX 65/11: X 59/13: XI 65/14. Pronotum very finely punctate, with lateral margins weakly rounded, lateral margin carinae distinct in dorsal view. Tip of scutellum exposed. Elytra with lateral margin carinae entirely well visible in dorsal view, apical margins rounded, inner apical angles not prominent, situated posterior to level of outer angles; sutural margin not raised, sutural striae deep, bent at pronotal lobe, not extending along basal margin, almost entirely parallel; adsutural areas flat, finely punctate. Elytral punctation dense and fairly coarse, much coarser than pronotal punctation, with puncture intervals mostly about as large to twice as large as puncture diameters. Hind wings fully developed. Mesepimeron about as long as interval to mesocoxa, almost four times as long as wide. Metaventrite not microsculptured, flattened apicomesally, lacking mesal or apicomedial impressions or striae, punctation on most of surface very fine and sparse, dense near apical process, antecoxal puncture rows absent. Submesocoxal areas 0.05 mm, about as one third of inter-



Figs. 48–51. *Scaphisoma peregrinum* n. sp., genitalia, aedeagus in dorsal (48) and lateral (49) views, internal sac in dorsal view (50), paramere in ventral view (51). – Scale-bars: 0.2 mm.

val to metacoxa, submesocoxal lines convex, coarsely punctate. Metanepisternum flat, narrowed anteriad, inner margin oblique, rounded near angles, in level with margin of metaventrite. Protibiae and metatibiae straight, mesotibiae curved. Abdomen with strigulate microsculpture, very finely punctate, submetacoxal areas about 0.05 mm, as one fourth of interval to apical margin of sternite 1; submetacoxal lines weakly convex, fairly coarsely punctate.

♂: Protarsomeres I and II strongly widened, almost as wide as protibial apices, III weakly widened; mesotarsome I and II distinctly widened, narrower than tibial apices. Aedeagus (Figs. 48–51) 1.14–1.15 mm long, symmetrical. Basal bulb weakly sclerotized, elongate, about as long as apical process. Apical process trifid, ventral branch swollen proximally, obliquely inflexed in apical half, with truncate tip. Dorsal branches short and robust, to a large part overlapped. Articular process not prominent. Parameres long and fairly narrow, lobed posterior to mid-length, with strongly bent basal section (lateral view); pores scattered, mostly situated near bases. Internal sac complex, with two

long admesal rods between tubular, denticulate structures, two short mesal sclerites in a sacculus, narrow proximal apophyses joint by bridge-like structure, and membranes bearing very dense denticles.

Comparative notes

This species is a member of the *S. haemorrhoidale* group and its aedeagal characters suggest relationship with *S. gracilicorne* Achard, 1920, known from Sumatra and Lombok (Löbl 2015). It may be easily distinguished from *S. gracilicorne* by the larger body (1.50–1.55 mm long in the latter species), the middle of the elytral disc not darkened, the parallel sutural striae, the elytral punctation coarse and dense all over the disc, the shape of the parameres, and the internal sac bearing two long admesal rods and two short mesal sclerites.

3.4 New record of *Scaphisoma* Leach, 1815

Scaphisoma irideum Löbl, 2012

Material examined: 1 ♀, Moluccas, Halmahera Island, 28 km S Tobela, Togoliua, 2.XI.1999, ca. 200 m, leg. A. Riedel (SMNS).

Distribution

The species is known only from the Island Halmahera.

3.5 Key to the Scaphidiinae of the Moluccan Islands

1 Antennae inserted at upper eye margins, longer than body. Basal pronotal angles rounded, not prominent. Mesepimera concealed. Elytra with coarse punctures in grooves. – Body black, antennomere XI light. ..... ***Bironium flavapex* n. sp.**

– Antennae inserted at lower eye margins, shorter than body. Basal pronotal angles prominent. Mesepimera visible. Elytra lacking grooves and coarse puncture rows. **2**

2 Antennomere III subcylindrical. Segment 4 of maxillary palpi aciculate. Submetacoxal lines absent. **3**

– Antennomere III subtriangular. Segment 4 of maxillary palpi gradually narrowed. Submetacoxal lines present. **9**

3 Metanepisterna distinct. Lateral parts of metaventrite very finely punctate. **4**

– Metanepisterna indistinct. Lateral parts of metaventrite very coarsely punctate. **5**

4 Larger species, 1.70 mm long. ..... ***Baeocera agostii*** Löbl, 2014

– Smaller species 1.05 mm long. ..... ***Baeocera* sp. A**

5 Elytra with sutural striae shortened, starting posterior to level of scutellum. **6**

– Elytra with sutural striae not shortened, starting near elytral basal margin. **7**

6 Body length 0.90 mm. Pronotum and elytra reddish-brown. Apex of median lobe abruptly inflexed (lateral view). ..... ***Baeocera kaibesara*** Löbl, 2014

– Body length 1.20–1.33 mm. Pronotum and elytra dark brown to blackish. Apex of median curved (lateral view). ..... ***Baeocera vicina* n. sp.**

7 Centre of metaventrite punctate. Hind wings reduced. ..... ***Baeocera yamdena*** Löbl, 2014

– Centre of metaventrite impunctate. Hind wings well developed. **8**

8 Body blackish. Pronotal punctation indistinct, or eventually only near base distinct. Aedeagus 0.35–0.38 mm long, parameres sinuate and widened apically in lateral view. ..... ***Baeocera vafra* n. sp.**

– Body reddish-brown, light. Pronotal punctation distinct. Aedeagus 0.26–0.28 mm long, parameres straight and widened in apical halves in lateral view. ..... ***Baeocera variata* n. sp.**

9 Pronotum microsculptured and iridescent. ..... ***Scaphisoma irideum*** Löbl, 2012

– Pronotum not microsculptured and not iridescent. **10**

10 Elytral and pronotal punctation similar, very fine, or elytral punctation distinctly coarser than pronotal punctation restricted onto minor discal surface. **11**

– Elytral punctation much coarser than pronotal punctation on entire, or most of discal surface. **17**

11 Sternite 1 with submetacoxal lines convex, submetacoxal areas larger than submesocoxal areas. **12**

– Sternite 1 with submetacoxal lines parallel, submetacoxal areas about as large as or smaller than submesocoxal areas. **15**

12 Elytra with sutural striae not bent along base and not extending to form basal striae. **13**

– Elytra with sutural striae bent along base and extending laterally to form basal striae. Aedeagus with long flagellum. **14**

13 Elytra and pronotum uniformly light reddish-brown. Aedeagus asymmetrical, with parameres very narrow and lobed apically. ..... ***Scaphisoma coarctatum*** Löbl, 1976

– Elytra with distinctive colour pattern. Aedeagus symmetrical, parameres not lobed. ..... ***Scaphisoma persimilans* n. sp.**

14 Antennomere XI about four times as long as wide and 1.4 times as long as X. Aedeagus with parameres arcuate in dorsal view, expanded and lobed ventrally. ..... ***Scaphisoma perfectum* n. sp.**

– Antennomere XI about 3.5 times as long as wide and about 1.2 times as longer as X. Aedeagus with parameres straight except at apices, not lobed ventrally. ..... ***Scaphisoma perturbator* n. sp.**

15 Body yellowish-brown or light reddish-brown, elytra with large dark transverse fascia. Hind wings well developed. Aedeagus with flagellum; large teeth-like sclerites lacking. ..... ***Scaphisoma permutatum* n. sp.**

– Pronotum and elytra uniformy dark brown or reddish-brown. Hind wings reduced. Aedeagus without flagellum, with large, teeth-like sclerites. **16**

16 Aedeagus with internal sac with bunch of very large, teeth-like sclerites. ..... ***Scaphisoma apterum*** Löbl, 2014

– Aedeagus with internal sac with two rows of robust, teeth-like sclerites. ..... ***Scaphisoma semibreve*** Löbl, 2014

17 Larger species, body length 1.85–1.88 mm. Pronotum and elytra uniformly light brown. ..... ***Scaphisoma peregrinum* n. sp.**

– Smaller species, body length below 1.70 mm. Elytra with distinctive colour pattern. **18**

18 Elytra light, yellowish, each darkened along base and along apical margin. Metaventrite with antecoxal puncture row. ..... ***Scaphisoma perminutum* n. sp.**

– Colour pattern of elytra different. Metaventrite without antecoxal puncture row. **19**

19 Elytra with sutural striae converging from bases to apices. Middle of metaventrite and sternite 1 microsculptured, submetacoxal lines convex. ..... ***Scaphisoma luteomaculatum*** Pic, 1915
– Elytra with sutural striae parallel posterior to level of scutellar tip. Metaventrite and sternite 1 usually not microsculptured..... **20**
20 Elytra each either with small dark apical spot, or darkened on large apical area. Abdominal sternite 1 with submetacoxal lines convex, submetacoxal areas larger than submesocoxal areas. **21**
– Elytra without dark apical spot and not darkened apically; apical third of elytra usually light. Abdominal sternite 1 with parallel submetacoxal lines, submetacoxal areas smaller than submesocoxal areas..... **22**
21 Body length 1.50 mm. Elytra darkened on large apical area extending along sides to middle third of elytral length. Abdominal sternite 1 not microsculptured..... ***Scaphisoma toxopeusi*** Löbl, 1976
– Body length 1.20 mm. Elytra darkened along basal margins and in the middle, and with small apical spots. Abdominal sternite 1 microsculptured. ..... ***Scaphisoma perleve*** **n. sp.**
22 Elytra dark, with small reddish subbasal band and light apical third. Apical process of aedeagus robust and oblique in lateral view, with acute tip in dorsal view. ..... ***Scaphisoma perdecorum*** **n. sp.**
– Entire or almost entire basal fourth to third of elytra reddish-brown, about as pronotum. Apical process of aedeagus narrow and usually sinuate in lateral view, with truncate tip in dorsal view..... **23**
23 Basal bulb of aedeagus without proximal apophysis, parameres not notched in lateral view, lacking subbasal spines, with inner margin crenulate..... ***Scaphisoma peraffirmatum*** **n. sp.**
– Basal bulb of aedeagus with proximal apophysis. **24**
24 Parameres not overlapping, lacking subbasal spines, median lobe widened at tip. ..... ***Scaphisoma spatulatum*** **n. sp.**
– Parameres overlapping apically, each with subbasal spine, median lobe with narrow tip. **25**
25 Upper margin of parameres emarginate posterior to mid-length in lateral view. Ventral margin of parameres crenulate. ..... ***Scaphisoma permixtum*** **n. sp.**
– Upper margin of parameres not emarginate. Ventral margin of parameres not crenulate..... ***Scaphisoma spinosum*** **n. sp.**

4 Discussion

The Scaphidiinae are common and diverse in the tropics but usually inadequately sampled and if collected, remain frequently unstudied because of poverty in experts (personal observation and experience). This is also true for the Moluccan Scaphidiinae. The currently known 26 species were collected by three persons only, on the Island Buru, and on the Yamdena and Halmahera island groups, respectively. Currently, only two species, *Scaphisoma coarctatum* and *S. luteomaculatum* are more widely distributed, three species have been found on two islands of the Halmahera group, the remaining species are from a single island, some represented in collections by a single specimen. Gaps in the knowledge of the Scaphidiinae are suggested, in addition, by the absence of members of some species-rich and widely distributed genera in South East Asia, New Guinea and Australia, such as *Scaphobaeocera* Csiki, 1909 and *Scaphoxium* Löbl, 1979.

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Revision of the Afrotropical genus *Perichilus* Quedenfeldt (Tenebrionidae: Stenochiinae), with description of a new species from South Africa

Wolfgang Schawaller

Abstract

The species of the Afrotropical genus *Perichilus* Quedenfeldt, 1885 (Stenochiinae Kirby, 1837, Cnodalonini Gistel, 1856) are revised, *P. ndumuicus* **n. sp.** from South Africa is described. Figures of diagnostic characters of all six species are given, and an updated identification key is added.

Key words: Tenebrionidae, Stenochiinae, Cnodalonini, *Perichilus*, new species, new records, species key.

Zusammenfassung

Die Arten der afrotropischen Gattung *Perichilus* Quedenfeldt, 1885 (Stenochiinae Kirby, 1837, Cnodalonini Gistel, 1856) werden revidiert, *P. ndumuicus* **n. sp.** aus Südafrika wird beschrieben. Diagnostische Merkmale aller sechs Arten werden abgebildet, und ein aktueller Bestimmungsschlüssel wird angefügt.

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2 The species of *Perichilus* 189
3 Key to the species of *Perichilus* 193
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1 Introduction

So far, the tenebrionid genus *Perichilus* Quedenfeldt, 1885 (type species *P. brevicornis* Quedenfeldt, 1885) (Stenochiinae Kirby, 1837, Cnodalonini Gistel, 1856) contains only a couple of species, distributed in the Afrotropical region including northeastern South Africa (Quedenfeldt 1885, Fairmaire 1887, Péringuey 1904, Ardoin 1976). Gebien (1921) presented a key of the few contemporary congeners, based mainly on coloration.

The genus might be placed near *Alcyonotus* Pascoe, 1882, and *Nannocerus* Fairmaire, 1887, and can easily be recognised by the extraordinarily short antennae, not surpassing the basal margin of the pronotum. Among specimens in the Ditsong National Museum of Natural History, Pretoria, a further species new to science from South Africa was discovered and is described herein. Additionally, all known species are revised, figures of diagnostic characters of all six species are given, and an updated identification key is provided.

Acronyms of depositories

CRG	Collection Dr. Roland Grimm, Neuenbürg, Germany
HNHM	Hungarian Natural History Museum, Budapest, Hungary
MNB	Museum für Naturkunde, Berlin, Germany
MNHN	Muséum National d'Histoire Naturelle, Paris, France
NHMB	Naturhistorisches Museum, Basel, Switzerland
SMNS	Staatliches Museum für Naturkunde, Stuttgart, Germany
TMSA	Ditsong National Museum of Natural History, Pretoria, South Africa

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Bernd Jäger (Berlin), Dr. Ottó Merkl (Budapest), Ruth Müller (Pretoria) and Dr. Eva Sprecher-Übersax (Basel) kindly loaned material from the collections under their care. The photographs were taken by Johannes Reibnitz (Stuttgart) with a Leica DFC320 digital camera on a Leica MZ16 APO microscope and subsequently processed by him with Auto-Montage (Syncroscopy) software. The referees Dr. Roland Grimm (Neuenbürg) and Dr. Ottó Merkl (Budapest) kindly improved the manuscript by their comments and corrections.

2 The species of *Perichilus*

Perichilus alternatus Ardoin, 1976
(Figs. 1, 7)

Examined material: Tanzania, Mt. Nguru (Mt. Unguu), 6°12′S/37°32′E, 15.–20.XI.2011, leg. A. Puchner, 1 ex. SMNS.

[1] Contributions to Tenebrionidae no. 126. For no. 125 see: Annals of the Ditsong National Museum of Natural History 5 (2015).

Remarks: This taxon should not be mistaken for *Falsoperichilus alternatus* Ardoin, 1965 from Cameroon and Congo, which turned out to be a junior synonym of *Falsonannocerus dentaticeps* Pic, 1946 (Schawaller 2012).

Type locality: "Mts. Uluguru".

Distribution: Tanzania (Ardoin 1976).

Perichilus brevicornis Quedenfeldt, 1885
(Figs. 2, 8)

Examined material: Cameroon, Douala, Bois des Singes, X.1958, leg. J. Cantaloube, 1 ex. TMSA (det. Ardoin). – Cameroon, Yaounde, Mont Febé, 16.VII.1963, leg. L. Segers, 1 ex. SMNS. – S Cameroon, Bipindi, X.–XII.1896, leg. G. Zenker, 3 ex. MNB, 1 ex. NHMB. – S Cameroon, Lolodorf, XII.1894–II.1895, leg. L. Conradt, 5 ex. MNB, 1 ex. NHMB. – Cameroon, Joh.-Albrechtshöhe, V.–VIII.1898, leg. L. Conradt, 3 ex. MNB. – S Cameroon, Longii, X.1910, leg. L. Kolin, 3 ex. MNB. – Cameroon, Océan Dept., Bipindi, 3–4.II.1971, leg. G. Nonveiller, 1 ex. HNHM (det. Kaszab). – Cameroon, Nyong-et-Kéllé Dept., Éséka, XII.1967, leg. G. Nonveiller, 3 ex. HNHM (det. Kaszab). – Cameroon, Lekié Dept., Nkolkossé, 13.V.1969, leg. G. Nonveiller, 3 ex. HNHM (det. Kaszab). – Cameroon, Ntem Dept., Mang, Ebolowa, X.1969, leg. G. Nonveiller, 2 ex. HNHM (det. Kaszab). – Cameroon, Sanaga-Maritime Dept., Ngambé, XII.1967, leg. G. Nonveiller, 1 ex. HNHM (det. Kaszab). – Cameroon, Mefou Dept., Nkoébé, 21.XI.1967, leg. G. Nonveiller, 1 ex. HNHM (det. Kaszab). – Cameroon, Nyong-et-Mfoumou Dept., Mbang-Ndellé, Akonolinga, V.1968, leg. G. Nonveiller, 1 ex. HNHM (det. Kaszab). – Gabon, Bas-Ogoué, no further data, 1 ex. SMNS. – Equatorial Guinea (labelled as Span. Guinea), Nkolentangan, XI.1907–V.1908, leg. G. Tessmann, 5 ex. MNB, 1 ex. NHMB.

Type material was not studied. There is no type material in MNB (Jäger in litt.), probably it is stored in coll. Oberthür (MNHN).

Type locality: Quedenfeldt (1885) did not specify a detailed type locality. According to the title of the paper, the type specimens were collected by Friedrich Wilhelm Alexander von Mechow at Quango (= Kwango) River (Angola/Congo border region).

Distribution: Angola/Congo border region (type locality); Congo (Gebien 1921); Ivory Coast (Ardoin 1969); Equatorial Guinea, Gabon, Cameroon (new records).

Perichilus ditissimus Péringuey, 1904
(Figs. 3, 9)

Examined material: South Africa, Natal, without date, leg. R. M. Martin, 5 ex. HNHM (det. Kaszab). – South Africa, Zululand, without date, leg. R. M. Martin, 1 ex. HNHM (det. Kaszab). – South Africa, Eteza, Zululand, 3.XI.1954, collector unknown, 1 ex. HNHM (det. Kaszab). – South Africa, KwaZulu-Natal, Gingindhlovu, 22.V.1926, leg. R. E. Turner, 1 ex. TMSA. – South Africa, KwaZulu-Natal, Empusheri Falls, 8.IV.1952, collector unknown, 1 ex. TMSA. – South Africa, KwaZulu-Natal, Nyala Game Reserve, X.1975, leg. P. E. Reavel, 1 ex. TMSA. – South Africa, KwaZulu-Natal, Mntunzini, 11.X.1976, leg. P. E. Reavel, 1 ex. TMSA. – South Africa, KwaZulu-Natal, Empangeni Univ., 14.X.1976, leg. P. E. Reavel, 1 ex. TMSA. – South Africa, KwaZulu-Natal, Karkloof Grassveld, 10.XII.1989, leg. S. Endrödy-Younga & J. Klimaszewski, 1 ex. TMSA. – South Africa, KwaZulu-Natal, 25 km NE Durban, 25.X.1990, collector unknown, 1 ex. SMNS. – South Africa, Mpumalanga, Potholes, 22.X.1982, leg. C. L. Bellamy, 1 ex. SMNS.

Type locality: "Natal, Eshowe".

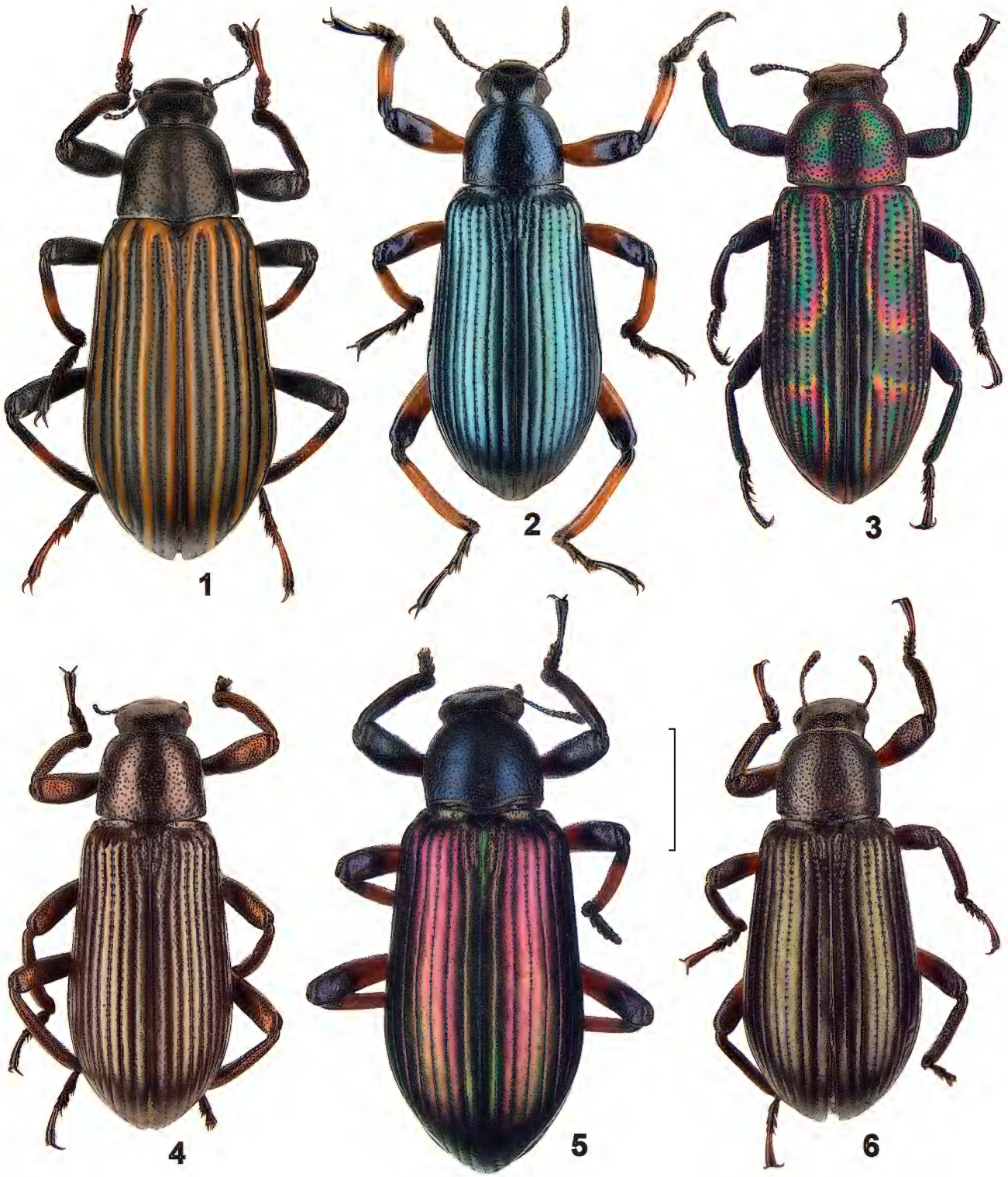
Distribution: Northeastern South Africa (KwaZulu-Natal, Mpumalanga).

Perichilus ndumuicus **n. sp.**
(Figs. 4, 10)

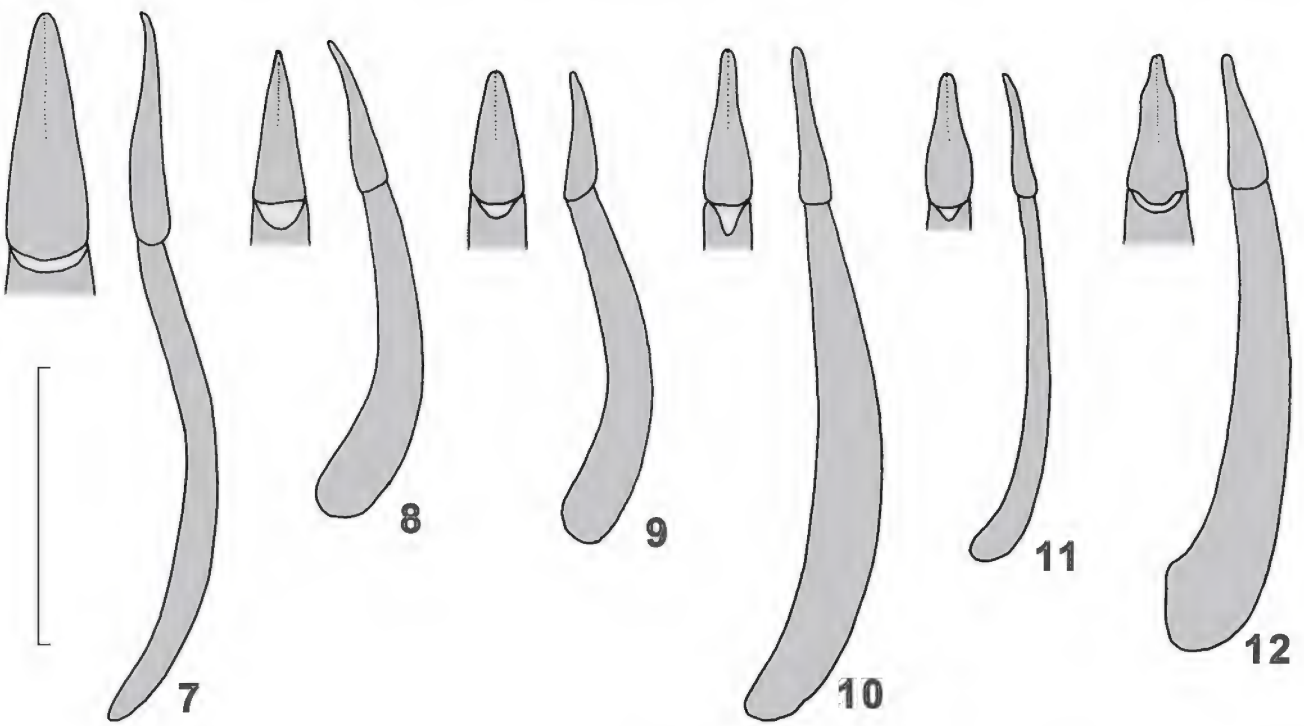
Holotype (♂): South Africa, KwaZulu-Natal [labelled as "Zulu-Ld."], Ndumu, 27°56′S/32°16′E, XII.1960, leg. P. de Moor, TMSA.

Etymology: Named after the Ndumu (= Ndumo) Nature Reserve, where the holotype was collected.

Description: Body length 7.5 mm. Body and all appendages unicoloured shining black with a brass lustre. Head with large but not confluent punctures as on pronotum, punctures of clypeus finer, punctures without microsetae, fronto-clypeal suture recognizable, head distinctly impressed along fronto-clypeal suture, clypeus separated from genae by rectangular emargination, anterior margin of clypeus straight, labro-clypeal membrane exposed; eyes reniform, without subocular furrow; antennomere 3 only slightly longer than antennomere 4 (distal antennomeres of both antennae missing). Pronotum (Fig. 4) subquadrate and widest at base, distal corners not protruding and rounded, basal corners pointed, with large but not confluent punctures similar as on head, punctures without microsetae, lateral margins completely bordered, distal margin unbordered in the middle, basal margin completely unbordered, lateral margins straight and not emarginate before posterior angles; propleura with similar punctation; prosternal apophysis bent down. Elytra (Fig. 4) elongate parallel, widest in posterior third; base of elytra with deep transverse impression; each elytron with 9 complete punctural rows with weak striae, third row with about 40 punctures, rows not joined basally, rows 4 and 5 joined posteriorly, punctures of rows smaller than on pronotum, punctures without microsetae, intervals distinctly convex, shagreened without punctures, lateral margin completely visible in dorsal view except shortly before apex; epipleura narrow throughout whole length, with distinct emargination shortly before apex. Abdominal ventrites laterally with large, partly wrinkled punctures which are smaller medially and posteriorly and without microsetae, last ventrite completely unbordered and without impression or other modifications, intersegmental membranes between



Figs. 1–6. *Perichilus* spp., dorsal views. – **1**. *P. alternatus*, non-type Nguru, SMNS. **2**. *P. brevicornis*, non-type Douala, TMSA. **3**. *P. ditissimus*, non-type Mntunzini, TMSA. **4**. *P. ndumuicus* n. sp., holotype, TMSA. **5**. *P. purpurinus*, non-type Moliwe, MNB. **6**. *P. violaceipes*, non-type Pemba, TMSA. – Scale: 2 mm.



Figs. 7–12. *Perichilus* spp., aedeagi, dorsal and lateral views. – **7**. *P. alternatus*, non-type Nguru, SMNS. **8**. *P. brevicornis*, non-type Douala, TMSA. **9**. *P. ditissimus*, non-type Ampangeni, TMSA. **10**. *P. ndumuicus* n. sp., holotype TMSA. **11**. *P. purpurinus*, non-type Nbanga, SMNS. **12**. *P. violaceipes*, non-type Iringa, SMNS. – Scale: 1 mm.

ventrites 3/4 and 4/5 exposed. Anterior tibiae with feeble interior emargination before tip, all tibiae rounded without keels or furrows, anterior tarsomeres not dilated, first tarsomere of anterior and middle tarsi not prolonged, first tarsomere of posterior tarsus only slightly prolonged and not longer than tarsomeres 2–3 combined. Aedeagus as in Fig. 10.

Diagnosis: *P. ndumuicus* n. sp. can be recognised by the absence of subocular furrows, the subquadrate pronotum widest at base with straight lateral margins, the base of elytra with deep transverse impression, the distinctly convex elytral intervals, unicoloured dark legs, and the shape of the aedeagus (Fig. 10). For separation from the other congeners see the key (section 3).

Perichilus purpurinus Gebien, 1921
(Figs. 5, 11)

Examined type material: Cameroon, Mukonje Farm, Mundame at Mungo, without date, leg. R. Rohde, 1 ♀ syntype NHMB, designated herewith as lectotype. – Cameroon, Mundame, leg. R. Rohde, 1 ♀ syntype HNHM, labelled as paralectotype. – Cameroon, Moliwe near Victoria, without further data, 2 ♀♀ syntypes NHMB, labelled as paralectotypes.

Examined material: NW Cameroon, Moliwe near Victoria, 1.–8.XII.1907, leg. Frfr. von Maltzan, 9 ex. MNB, 1 ex. NHMB. – Cameroon, Edjom P. A., 22.–23.IV.1971, leg. G. Nonveiller, 1 ♀ TMSA, 1 ex. HNHM (det. Kaszab). – Cameroon, Nbanga P. A., zone Bonbon, I.1973, leg. G. Nonveiller, 1 ♂ SMNS (det. Kaszab). – Cameroon, Nyong-et-So'o Dept., Metet, XII.1968, leg. G. Nonveiller, 1 ♀ HNHM (det. Kaszab). – Cameroon, Boumba Ngoko Dept., Ngola, Yokadouma, 6–7.I.1971, leg. G. Nonveiller, 1 ex. HNHM (det. Kaszab). – Cameroon, Boumba Ngoko Dept., Moloundou, 18.–19.I.1971, leg. G. Nonveiller, 4 ♂♂ HNHM (det. Kaszab). – Cameroon, Mefou Dept., Awaé, Olenguina, XI.1967, leg. G. Nonveiller, 2 ♀♀ HNHM (det. Kaszab). – Cameroon, Ntem Dept., Meyo-Centre, Ebolowa, V.1969, leg. G. Nonveiller, 1 ♀ HNHM (det. Kaszab). – Cameroon, Kadey Dept., Djompiel, Batouri, XI.1969, leg. G. Nonveiller, 1 ex. HNHM (det. Kaszab).

Remarks: See below under *Perichilus* sp. from Sierra Leone.

Type locality: "Mukonje-Farm".

Distribution: Cameroon (Gebien 1921).

Perichilus violaceipes Fairmaire, 1887
(Figs. 6, 12)

Examined material: Congo, Yangambi, XI.1959, leg. E. Haaf, 4 ex. NHMB, 2 ex. SMNS. – Congo, Luki, 1951, leg. P. Henrad, 1 ex. TMSA. – Uganda, Kampala, 5.IV.1974, leg. Hájková, 1 ex. NHMB. – Kenya, Mombasa, Mtwapa Creek, IV.1950, leg. E. Pinhey, 1 ex. SMNS. – Kenya, Mombasa,

Kwale, Shimba Hills NP, 300 m, 5.IV.2004, leg. L. PUCHNER, 1 ex. SMNS. – Kenya, Mombasa, Diani Beach, IV.1990, leg. G. WALLABERGER, 1 ex. CRG. – Kenya, Kilifi, IV.1943, leg. G. W. JEFFERY, 1 ex. TMSA. – Tanzania, Zanzibar (labelled as Zanguebar), Mhonda-Ouzigoua, 1879/1880, leg. A. HACQUARD, 2 ex. HNHM (det. KASZAB). – Tanzania (labelled as D. O. A.), dry forest near Miotohovu, IV.1916, leg. METHNER, 2 ex. MNB (det. GEBIEN). – Tanzania (labelled as D. O. Afr.), SE Kilimandjaro, 20.–21.I.1906, leg. C. SCHRÖDER, 1 ex. MNB. – Tanzania (labelled as D. O. Afr.), without further data, 1 ex. NHMB (det. GEBIEN). – S Tanzania, 80 km NE Iringa, 650 m, 9.–10.I.2007, leg. F. KANTNER, 1 ex. SMNS. – Mozambique, Pemba Bay, 1904, leg. P. A. SHEPPARD, 1 ex. TMSA.

Type locality: "Makdischu" (= Mogadishu).

Distribution: Somalia, Tanzania including Zanzibar (FAIRMAIRE 1887); Kenya (FERRER 1996); Congo, Uganda, Mozambique (new records).

Perichilus sp.

Examined material: Sierra Leone, Lester Peak near Freetown, 400 m, 9.II.1979, leg. J. KLAPPERICH, 1 ♂ 1 ♀ HNHM.

Remarks: The identification of these two specimens remains doubtful. They are in many characters, also in the shape of the aedeagus, quite similar to *P. purpurinus* (Fig. 5), known so far only from Cameroon, but the dorsal surface has a unicoloured brass lustre, and the elytral intervals are slightly convex. At present, these differences seem too weak for separating them as a new species.

3 Key to the species of *Perichilus*

1 Head with deep subocular furrows. – Figs. 3, 9.... ***ditissimus***
– Head without subocular furrows. **2**
2 Base of elytra without transverse impression; elytra with intervals 1, 3, 5 and 7 completely yellow, and intervals 2, 4, 6 and 8 blackish with feeble metallic lustre. – Figs. 1, 7. ..... ***alternatus***
– Base of elytra with deep transverse impression; elytra with metallic shine, all intervals unicoloured. **3**
3 All elytral intervals convex, legs unicoloured dark. – Figs. 4, 10. ..... ***ndumuicus* n. sp.**
– All elytral intervals flat, at least in the middle and posterior legs bicoloured with large parts of tibiae and basal parts of femora yellow besides dark tarsi and dark distal parts of femora..... **4**
4 All punctures of elytral rows large and distinctly surpassing striae; apicale of aedeagus pentagonal. – Figs. 6, 12. ..... ***violaceipes***
– Punctures of elytral rows small and not surpassing striae (at least on elytral disc); apicale of aedeagus triangular..... **5**
5 Anterior femora with black part extending to apical half; anterior tibiae usually completely black, sometimes middle part yellowish; elytra usually bicoloured: purplish violet with sutural and lateral interstriae greenish, greenish area may be more extended (sometimes whole elytra green); apicale of aedeagus with rounded tip. – Figs. 5, 11. ..... ***purpurinus***
– Anterior femora with black part extending to apical one-third; anterior tibiae always yellow except base and apex, similar to middle and posterior tibiae; elytra always unicoloured green or blue; apicale of aedeagus with acute tip. – Figs. 2, 8..... ***brevicornis***

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The genus *Uloma* Dejean (Coleoptera: Tenebrionidae: Tenebrioninae) in Africa south of the Sahara[1]

Wolfgang Schawaller

Abstract

The species of the genus *Uloma* Dejean, 1821 (Coleoptera: Tenebrionidae: Ulomini) from Africa south of the Sahara and adjacent islands are revised. The diagnostic characters are figured, and a species key is provided for the 15 species of continental Africa. – Lectotypes are designated for *U. collaris* Gebien, 1921, *U. parva* Gebien, 1921, *U. sjoestedti* Gebien, 1904, and *U. pachycera* Gebien, 1921 [synonym of *U. sulcipennis* (Thomson, 1858)]. – New combinations and synonyms: *Cenoscelis minuscula* (Ardoin, 1969) **n. comb.** for *Uloma (Eutochia) pumilio* Bremer, 2001 **n. syn.**, *Cenoscelis maculipennis* (Grimm, 2002) **n. comb.** transferred from *Eutochia*. All species of *Uloma* live in red-rotten wood or under the barks of trees, even outside forests, in savannas, or in cultivated land.

K e y w o r d s : Coleoptera, Tenebrionidae, *Uloma*, *Cenoscelis*, Africa, taxonomy, species key.

Zusammenfassung

Die Arten der Gattung *Uloma* Dejean, 1821 (Coleoptera: Tenebrionidae: Ulomini) aus Afrika südlich der Sahara und der angrenzenden Inseln werden revidiert. Die diagnostischen Merkmale werden abgebildet, und ein Bestimmungsschlüssel für die 15 Arten aus dem kontinentalen Afrika wird erstellt. – Lectotypen werden festgelegt für *U. collaris* Gebien, 1921, *U. parva* Gebien, 1921, *U. sjoestedti* Gebien, 1904 und *U. pachycera* Gebien, 1921 [Synonym von *U. sulcipennis* (Thomson, 1858)]. – Neue Kombinationen und Synonyme: *Cenoscelis minuscula* (Ardoin, 1969) **n. comb.** von *Uloma (Eutochia) pumilio* Bremer, 2001 **n. syn.**, *Cenoscelis maculipennis* (Grimm, 2002) **n. comb.** von *Eutochia*. Alle *Uloma*-Arten leben in rotfaulem Holz oder unter der Rinde von Bäumen, auch außerhalb von Wäldern in Savannen oder in Kulturland.

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1 Introduction

The genus *Uloma* Dejean, 1821 (subfamily Tenebrioninae Latreille, 1802) is widespread in nearly all zoogeographical regions of the Old and New World. The genus is particularly speciose in the tropics, more than 200 species are described. All species live in red-rotten wood or under the barks of trees, even outside temperate or tropical forests in savannas, or in cultivated land.

Recent taxonomic revisions are published only for a few regions, i. e. Australia (Kaszab 1982), Japan, Korea and Taiwan (Masumoto & Nishikawa 1986), Himalayas (Schawaller 1996), Borneo and Sumatra (Schawaller 2000), and China (e. g. Liu et al. 2011). The species from tropical Africa south of the Sahara, and including the adjacent islands Madagascar, Seychelles etc. were summarised by Gebien (1921). Subsequently, several additional species from tropical Africa were described in single papers (Ardoin 1958, 1962, 1963, 1965, 1969, 1976; Kaszab 1969), but a comprehensive survey was never updated. The aim of the present paper is to fill this gap, 19 species are treated, species characters are figured and newly collected material is listed.

Uloma minuscula Ardoin, 1969 is excluded herein from *Uloma*, and transferred to the genus *Cenoscelis* Wollaston, 1867. Two other taxa were never published again after the original description, and type material was not available: *Uloma fastidiosa* Fairmaire, 1882, described from eastern Africa, is, according to Gebien (1921), no *Uloma* because of the undentate anterior tibiae, and probably a synonym of the widespread *Cenoscelis pulla* (Erichson, 1843). Also the identity of *Uloma owariensis* (Palisot de Beauvois, 1805), described in the genus *Phaleria* from "Oware" in western Africa, is not yet solved.

[1] Contributions to Tenebrionidae no. 127. For no. 126 see: Stuttgarter Beiträge zur Naturkunde A, Neue Serie 8 (2015).

Acronyms of depositories

CML	Collection Martin Lillig, Saarbrücken, Germany
CNC	Canadian National Collection of Insects, Ottawa, Canada
CRA	Collection Dr. Rolf Aalbu, Dorado Hills, USA/ California
CRG	Collection Dr. Roland Grimm, Neuenbürg, Germany
HNHM	Hungarian Natural History Museum, Budapest, Hungary
MNB	Museum für Naturkunde, Berlin, Germany
MRAC	Museé Royal de l'Afrique Centrale, Tervuren, Belgium
NHMB	Naturhistorisches Museum, Basel, Switzerland
SMNS	Staatliches Museum für Naturkunde, Stuttgart, Germany
TMSA	Ditsong National Museum of Natural History, Pretoria, South Africa
ZSM	Zoologische Staatssammlung, München, Germany

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2 The African species of *Uloma*

Uloma basilewskyi Ardoin, 1976
(Figs. 7, 19–21)

Type material examined: Tanzania, Uluguru Mts., Chenzema, Ulindi Forest, 2000–2400 m, 2.–22.VII.1971, leg. L. Berger, N. Leleup & J. Debecker, 2 ♂♂, 1 ♀ paratypes HNHM.

Additional material examined: Tanzania (labelled as D. O. Afrika). Uluguru Mts., XI.–XII.1898, leg. S. Götze, 4 ♀♀ MNB. – Tanzania (labelled as Tanganyika Terr.), Uluguru Mts., Bunduki, 1300 m, 7.V.1957, leg. P. Basilewsky & N. Leleup, 1 ♀ SMNS.

Type locality: "Ulindi Forest".

Distribution: Tanzania (Ardoin 1976).

Uloma brevipennis Gebien, 1921
(Figs. 8, 22–24)

Type material examined: Tanzania, Usambara, Neu Bethel, 1903, collector unknown, ♂ holotype NHMB.

Additional material examined: Tanzania, Usambara, Neu Bethel, without date, leg. J. Moser, 2 ♂♂ NHMB. – Tanzania, Usambara, Neu Bethel, IX.1903, collector unknown, 1 ♂ SMNS. – Tanzania (labelled as D. O. Afr.), Nguelo, without further data, 1 ♀ ZSM, 1 ♀ HNHM (both det. Gebien). – Tanzania, Usambara, without further data, 4 ex. MNB.

Type locality: "Neu Bethel, Usambara".

Distribution: Tanzania (Gebien 1921).

Uloma cantaloubei Ardoin, 1962
(Figs. 6, 25–27)

Material examined: Ivory Coast, Banco NR, without date, leg. R. Paulian & G. Delamare, 1 ♂ HNHM (det. Ardoin). – SE Cameroon (labelled as Kamerun), Lolodorf, 19.II.–7.VI.1895, leg. L. Conradt, 1 ♂ MNB. – NW Cameroon, Moliwe near Vicoria, 7.III.–1.IV.1908, leg. Frfr. von Maltzan, 1 ♀ MNB.

Type locality: "Yabassi".

Distribution: Cameroon (Ardoin 1962); Congo (Ardoin 1965); Ivory Coast (new record).

Uloma collaris Gebien, 1921
(Figs. 1, 28–30)

Type material examined: Is. Principe, Roca inf. D. Henrique, 200–300 m, I.1901, leg. L. Fea, 1 ♂ syntype HNHM, designated herewith as lectotype. – Same data, 1 ♂, 1 ♀ syntypes NHMB, now labelled as paralectotypes.

Type locality: "Roca inf., Ins. Principe".

Distribution: São Thomé and Principe (Island Principe) (Gebien 1921).

Uloma comorensis Gebien, 1922
(Fig. 2)

Type material examined: Grande Comore, coast (labelled as "Küste"), 1903, leg. Voeltzkow, 1 ♀ syntype HNHM. – Type series not present in MNB (pers. comm. B. Jäger).

Additional material examined: Grande Comore, plans d'Afayou, II.1984, leg. A. Rautenstrauch, 1 ♀ SMNS.

Type locality: "Gr. Comoro".

Distribution: Comores (Gebien 1922).

Uloma costae Karsch, 1881
(Figs. 3, 34–36)

Type material examined: São Thomé (labelled as S. Thomé), without further data, ♂ holotype MNB (Nr. 60989).

Additional material examined: São Thomé (labelled as S. Thomé), 400–700 m, XII.1900, leg. L. Fea, 2 ex. NHMB. – São Thomé (labelled as San Thomé), without further data, 1 ♂ SMNS. – Gabon, Bas-Ogué, Lambarene, without data, 1 ♀ TMSA.

Remarks: Redescription in Gebien (1921).

Type locality: "Ilha de São Thomé".

Distribution: São Thomé and Principe (Island São Thomé) (Gebien 1921); Gabon (new record).

Uloma crenatostriata Fairmaire, 1868
(Figs. 9, 31–33)

Material examined: Seychelles, Mahé, Cascade Estate, 800–2000 ft. (240–610 m), II.1909, collector unknown, 1 ♂ HNHM (det. Gebien, labelled as "plesiotype"). – Seychelles, Mahé, without data, 3 ex. NHMB (det. Gebien, labelled as "plesiotype"). – Zanzibar, without data, 1 ♀ TMSA (det. Gebien).

Type locality: "Mahé".

Distribution: Seychelles (Gebien 1922); Zanzibar (new record).

Uloma foveicollis (Thomson, 1858)
(Figs. 5, 40–42)

Ceratupis foveicollis Thomson, 1858.
Uloma procera Kolbe, 1897 syn.

Material examined: Gabon, without further data, 2 ex. SMNS. – Cameroon, N'Kongsamba, VIII.1957, leg. J. Cantaloube, 1 ex. HNHM (det. Ardoin). – Cameroon, Victoria, without further data, 1 ex. HNHM (det. Gebien, labelled as "plesiotype"). – Cameroon, Joko, without further data, 2 ex. HNHM. – Cameroon, Yaounde, Mefou, X.1967, leg. G. Nonveiller, 1 ex. HNHM. – Congo, Lubutu, Kakolo, 3.X.1929, leg. A. Collart, 1 ex. HNHM. – Congo, Lefinie NR, 9.I.1964, leg. J. Balogh & A. Zicsi, 1 ex. HNHM. – Congo, Mosanga, Tshuapa, without date, leg. Massart, 1 ex. HNHM. – Congo, Kivu, Bukavu, 2000 m, I.2000, leg. E. Kitambala, 4 ex. HNHM. – Congo, Kivu, Kahuzi, IV.1966, leg. Jilly, 7 ex. SMNS. – Congo, Parc Albert (new name Virunga NP), northern part, without date, leg. P. Jolivet, 2 ex. TMSA, 1 ex. SMNS. – Tanzania, Mufindi, X.1938, leg. F. Zumpt, 2 ex. TMSA. – Tanzania (labelled as D. O. Afrika), Tanga, 1903, leg. S. G. Vosseler, 1 ex. HNHM. – Tanzania (labelled as D. O. Afrika), Nguru, without further data, 3 ex. HNHM. – Tanzania, Mt. Nguru, without further data, 1 ex. TMSA, 1 ex. SMNS (det. Kaszab). – Tanzania, Victoria Lake, Ukerewe Island, without date, leg. P. A. Conrads, 1 ex. TMSA, 1 ex. SMNS.

Type localities: "Gabon" (*U. foveicollis*), "Usambara, Nguelo" (*U. procera*).

Distribution: Gabon (type locality); Equatorial Guinea, Cameroon (Gebien 1921); Guinea (Ardoin 1963); Congo (Ardoin 1965, Kaszab 1969); Tanzania (Gridelli 1954, Ardoin 1976).

Uloma intrusicollis Fairmaire, 1868
(Figs. 13, 43–45)

Uloma hondana Kolbe, 1897 syn.

Material examined: E Congo, Albertville (= Kalemie), westbank of Tanganjika Lake, 1000–2000 m, 24.XII.1939, leg. R. Votion, 1 ex. HNHM. – Comores (labelled as Gr. Comoro), coast, 3.VIII.1903, leg. S. Voeltzkow, 2 ♀♀ MNB (det. Kulzer). – Tanzania, Nguelo, Usambara, without further data, 1 ♂ HNHM, 1 ♀ TMSA (both det. Gebien, labelled as "plesiotype"). – Tanzania, Nguelo, Usambara, without further data, 24 ex. MNB. – Tanzania, between Dar-es-Salam and Tanganjika Lake, without further data, 2 ex. HNHM. – Tanzania, Victoria Lake, Ukerewe Island, without date, leg. P. A. Conrads, 4 ex. TMSA, 2 ex. SMNS. – Tanzania, Mgorogoro Prov., 10 km N Mikumi, 11.I.2007, leg. F. Kantner, 1 ex. SMNS. – Zambia, Abercorn (= Mbala), 15.XII.1943, leg. H.-J. Brédo, 1 ex. HNHM. – Zambia, Western Prov., 7.6 km S Ushaa, 1050 m, degraded Zambezian *Cryptosepalum* dry forest, light trap, 2.XII.2010, leg. F. Génier, 1 ex. CNC. – Zambia, Ikengele, Nchila NR, 6.XI.2002, leg. F. Wachtel, 1 ex. CRG. – Zambia, Western Prov., 7 km S Sefula, 1060 m, 1.XII.2010, leg. S. Rojkoff, 1 ex. SMNS. – Mozambique, Zambezia Prov., Grué, Mt. Namuli, 870 m, 9.XII.2006, leg. P. Schüle, 1 ex. SMNS. – Mozambique, Massinga, 4.–15.IV.1952, leg. M. Ferreira, 2 ex. TMSA. – Mozambique, Beira, without date, leg. A. Bodong, 1 ex. TMSA.

Type localities: "Île Mayotte" (*U. intrusicollis*), "Mhonda in Unguu" (*U. hondana*).

Distribution: Comores (Gebien 1922); Tanzania (Gebien 1922, Ardoin 1976); E Congo, Zambia, Mozambique (new records).

Uloma laesicollis Thomson, 1858
(Figs. 11, 37–39)

Material examined: Equatorial Guinea, Fernando Poo, 1900, leg. L. Conradt, 5 ex. MNB. – Guinea, Kindia, 21.–28.III.1964, leg. Šabacký, 3 ex. HNHM, 1 ex. SMNS. – Guinea, Coyah, 1968, leg. K. Ferencz, 1 ex. HNHM. – Liberia, 11.IX.1977, leg. Zimmermann, 1 ex. SMNS. – Liberia, Montserrado County, Peter Town, 26.III.1988, leg. F.-T. Krell, 1 ex. SMNS. – Nigeria, Ile-Ife, 8.VII.1988, leg. F.-T. Krell, 1 ex. SMNS. – Togo, Sokodé, Kpangalam, 7.VI.1988, leg. F.-T. Krell, 2 ex. SMNS. – Ghana, Ashanti, Kumasi, 330 m, 16.VI.1966, leg. S. Endrödy-Younga, 1 ex. HNHM. – Congo, Brazzaville, Kindamba, Méya, 2.XI.1963, leg. S. Endrödy-Younga, 1 ex. HNHM. – Congo, Kivu, Irangi, 850 m, 20.IX.–7.X.1993, leg. C. Leidenroth, 1 ex. SMNS. – Congo, Katanga, Kinda, without further data, 1 ex. TMSA (det. Gebien). – Congo, Mayidi, 1943, leg. P. van Eyen, 1 ex. TMSA, 1 ex. SMNS. – Congo, Bambesa, VII.1937, leg. J. Vrydagh, 6 ex. HNHM, 2 ex. TMSA. – Congo, Elisabethville, 15.XII.1938, leg. H.-J. Brédo, 1 ex. HNHM. – Congo, Stanleyville, 4.VI.1929, leg. A. Collart, 1 ex. HNHM. – Congo, Lubuto (= Masua), 5.IX.1929, leg. A. Collart, 4 ex. HNHM. – NW Cameroon, Moliwe near Victoria, XI.1907–I.1908, leg. Frfr. von Maltzan, 8 ex. MNB. – Cameroon, Joko, without further data, 7 ex. HNHM. – Cameroon, N'Kongsamba, VII.1957, collector unknown, 3 ex. HNHM, 3 ex. TMSA. – Cameroon, 7 miles S Ebolowa, 580 m, 15.–17.X.1966, leg. E. S. Ross & K. Lorenzen, 1 ex. CRA. – Cameroon, Yaounde, Centre Agron, 710 m, 8.XI.1966, leg. E. S. Ross & K. Lorenzen, 1 ex. CRA. – Cameroon, Mbalmayo, 640 m, 16.VII.1980, leg. R. Aalbu, 1 ex. CRA. – Central African Republic, 90 km N Carnot, 820 m, 23.III.2010, leg. J. Halada, 1 ♀ CRG. – Angola, Huila Prov., 10 km S Kakula, 1560 m, 4.XI.2011, leg. R. Müller, 1 ex. TMSA.

Type locality: "Gabon".

Distribution: Gabon (type locality); Equatorial Guinea, Congo (Gebien 1921, Kaszab 1969); Ivory Coast (Ardoin 1969); Cameroon, Guinea (Gridelli 1954); Liberia, Ghana, Central African Republic, Angola (new records).

Uloma obscurina Ardoin, 1962
(Figs. 15, 46–48)

Material examined: Cameroon, N'Kongsamba, IV.–V.1957, leg. J. Cantaloube, 2 ex. HNHM, 4 ex. TMSA (erroneously labelled as paratypes). – Cameroon, Abong-Mbang, 1959, leg. R. Lenczy, 2 ex. HNHM. – Cameroon, Nanga Eboko, VII.–X.1959, leg. R. Lenczy, 1 ex. HNHM. – Cameroon, North West Prov., Big Babanki, 1200 m, 5.–13.III.2008, leg. M. Řiha, 2 ex. SMNS. – Cameroon, Bamenda, 28.IX.1973, leg. R. Tremper, 2 ex. CRA. – Congo, Bambesa, II.1940, leg. J. Vrydagh, 7 ex. HNHM, 2 ex. TMSA. – Congo, Eala, VI.1935, leg. J. Ghesquière, 2 ex. HNHM. – Congo, Brazzaville, Loudima, XII.1963, leg. S. Endrödy-Younga, 3 ex. HNHM. – Congo, Semliki Forest, VIII.1959, leg. C. Koch, 3 ex. NHMB. – W Kenya, Kakamega Forest NR, Buyango Hill, 1600–1670 m, 18.–20.I.2004, leg. F. Haas, J. Holstein & A. Zahm, 3 ex. SMNS. – W Kenya, Kakamega Forest NR, 1600 m, 21.IX.–10.X.2005, leg. D. Bartsch & J. Holstein, 1 ex. SMNS.

Remarks: The original description of *U. obscurina* by Ardoin (1962) specified only a holotype and a single "allotype", i. e. paratype. The specimens in HNHM, NHMB and TMSA, originating from the type locality, are labelled by Ardoin as paratypes, but are not listed as paratypes in the publication and so do not belong to the type series.

Type locality: "N'Kongsamba".

Distribution: Cameroon (Ardoin 1962); Guinea (Ardoin 1963); Congo (Ardoin 1965, Kaszab 1969).

Uloma parva Gebien, 1921
(Figs. 17, 18, 49–51)

Type material examined: Fernando Poo, Basilé, 400–600 m, VIII.–IX.1901, leg. L. Fea, 1 ♂ syntype HNHM, designated herewith as lectotype.

Additional material examined: Equatorial Guinea (labelled as Span. Guinea), Nkolentangan, XI.1907–V.1908, leg. G. Tessmann, 4 ex. MNB. – Togo, Bismarckburg, without date, leg. L. Conradt, 4 ex. MNB. – Cameroon, Duala, IX.1912, leg. von Rothkirch, 8 ex. MNB. – NW Cameroon, Moliwe near Victoria, 18.–30.XI.1907, leg. Frfr. von Maltzan, 1 ex. MNB. – Equatorial Guinea (labelled as Span. Guinea), Seredou, IV.–V.1975, leg. Zott, 13 ex. MNB. – S Cameroon, Joko, no date, 1 ex. TMSA (det. Gebien). – Cameroon, Yaounde, IV.–X.1980, leg. R. Aalbu, 6 ex. CRA, 1 ex. SMNS. – Cameroon, Kumba Station, 31.VII.1988, leg. F.-T. Krell, 1 ex. SMNS. – Cameroon, Buea, 4.–11.II.1980, leg. M. Schlegel & H. Schmalfuss, 1 ex. SMNS, 5 ex. CRG. – Congo, Brazzaville, Orstom, 19.X.1963, leg. S. Endrödy-Younga, 2 ex. HNHM. – Congo, Brazzaville, Lefinie NR, I.1964, leg. J. Balogh & A. Zicsi, 4 ex. HNHM. – Congo, Libenge, Savane Liki-Bembe, 27.II.1948, leg. R. Cremer & M. Neuman, 7 ex. HNHM. – Congo, Masanga, 10.XI.1927, leg. A. Collart, 1 ex. SMNS. – Congo, Stanleyville, 15.–18.IV.1928, leg. A. Collart, 1 ex. TMSA. – Congo, Yangambi, 27.–31.VIII.1954, leg. H. Franz, 2 ex. NHMB. – Congo, Semliki Forest, VIII.1959, leg. C. Koch, 1 ex. NHMB.

Type locality: "Fernando-Poo" (= Bioko).

Distribution: Equatorial Guinea (Gebien 1921); Cameroon, Guinea (Ardoin 1963); Congo (Ardoin 1965, Kaszab 1969); Togo (new record).

Uloma polita (Wiedemann, 1821)
(figures see Schawaller 1996)

Phaleria polita Wiedemann, 1821.
Uloma scita Fairmaire, 1894 (not *Uloma scita* Walker, 1858).

Material examined: Rodrigues Island, Anse aux Anglais, Port Mathurin, 22.IX.1995, leg. R. Fricke, 1 ex. SMNS. – Madagascar, Antsiranana (labelled as Diego Suarez), without further data, 2 ex. SMNS.

Remarks: Gebien (1912) redescribed the type.

Type locality: "Bengalia".

Distribution: Widespread in the Oriental Region, Mauritius, Rodrigues Island, Madagascar.

Uloma pusilla Gerstaecker, 1871
(Figs. 14, 52–54)

Material examined: Ethiopia (labelled as Abyssinia), Urso (= Hoorsa, Ourso), without further data, 1 ex. HNHM. – Ethiopia, Kaffa Prov., Mui Game Reserve, 700 m, 10.IV.1972, leg. R. Clarke, 2 ex. MRAC. – Zanzibar, without date, leg. A. Raffray, 1 ex. ZSM. – Congo, Kivu, Butembu, I./V.1956, leg. R. Célis, 2 ex. TMSA. – Tanzania, 100 km on Kahama Road, 1200 m, 24.XII.2006, leg. F. Kantner, 1 ex. SMNS. – Tanzania, Pwani Prov., 70 km E Morogoro, 300 m, 12.XII.2006, leg. F. Kantner, 1 ex. SMNS. – Tanzania, Vomoro Distr., Wami, 8.–30.XII.2007, leg. C. Jorom, 3 ex. SMNS. – Tanzania (labelled as Tangganyika), Usa River, 3900 ft. (1190 m), 15.IX.–25.XI.1965, leg. J. Szunyoghy, 1 ex. HNHM. – Tanzania, E shore of Sereri Lake, 3150 ft. (960 m), 11.–27.VIII.1965, leg. J. Szunyoghy, 3 ex. HNHM. – Tanzania, Morogoro, II.1970, leg. T. Pócs, 8 ex. HNHM. – Tanzania, Morogoro, University Campus, 2.VII.1988, leg. T. Pócs, 1 ex. HNHM. – Tanzania (labelled as D. O. Afrika), Tanga, without date, leg. Vosseler, 3 ex. MNB. – Tanzania, (labelled as D. O. Afrika), Daressalam, without date, leg. G. Regner, 1 ex. MNB. – Kenya, Witu, Kipini, without date, leg. F. Thomas & G. Denhardt, 3 ex. MNB. – Kenya (labelled as Afr. or.), Shirati, 1909, leg. Katona, 15 ex. HNHM. – Kenya, Kilifi Distr., Arabuko Sokoke Forest Reserve, 20 km S Malindi, 21.V.–7.VI.1994, leg. L. Bartolozzi et al., 1 ex. HNHM. – Kenya, Simba Hills, 8.–9.III.2002, leg. S. & L. Mahunka, 1 ex. HNHM. – Kenya, Voi, 20.XI.1972, leg. H. Walker, 1 ex. CRA. – Kenya, Tsavo, Voi, 8.–18.XI.1996, leg. M. Snižek, 8 ex. ZSM, 1 ex. SMNS. – Zambia, Ikengele, Nchila NR, 6.XI.2002, leg. F. Wachtel, 1 ex. CRG. – South Africa, Limpopo, Krüger NP, Punda Milla, 21.–23.XI.1961, leg. L. Vári & Rorke, 6 ex. TMSA. – South Africa, Limpopo, Krüger NP, Letaba Camp, 14.–18.XI.1961, leg. L. Vári & Rorke, 7 ex. TMSA. – South Africa, Limpopo, Krüger NP, Skukuza Research Camp, 1.–16.XII.2010, leg. J. Harrison, 2 ex. TMSA. – South Africa, Limpopo, Nylsvley NR, 1975/1976, leg. S. Endrödy-Younga, 10 ex. TMSA, 1 ex. SMNS. – South Africa, Limpopo, Thabaphaswa, 14.XII.2003, leg. R. Müller, 1 ex. TMSA. – South Africa, Limpopo, Combretum Park, 9.XI.2002, leg. R. Müller, 1 ex. TMSA. – South Africa, Limpopo, Mapungubwe, Little Muck NR, 500 m, 6.–9.XII.2008, leg. W. Schawaller, 1 ex. SMNS. – South Africa, Transvaal, Nelshoogte Galery Forest, 4.III.1986, leg. S. Endrödy-Younga, 2 ex. TMSA. – South Africa, Transvaal, Nelspruit Distr., Farm de Hoop, 20.–21.XI.1972, leg. A. Strydom, 1 ex. TMSA. – South Africa, Transvaal, Barberton Distr., Farm Alfa, no. 448, 22.–26.XI.1972, leg. S. Endrödy-Younga, 1 ex. TMSA.

– South Africa, Transvaal, Pretoria, Soutpan, 19.XI.1983, leg. S. ENDRÖDY-YOUNGA, 8 ex. TMSA. – South Africa, Transvaal, Pretoria, Roodeplat, 17.–18.X.1980, leg. NEUBECKER, 2 ex. SMNS (det. KASZAB), 1 ex. TMSA. – South Africa, Transvaal, Waterval Farm, XI.–XII.1991, leg. R. DIXON, 3 ex. TMSA. – South Africa, Mpumalanga, Ezemvelo NR, 27.I.2004, leg. TMSA staff, 1 ex. TMSA. – South Africa, Mpumalanga, Steelport, Didingwe Lodge, 15.X.2002, leg. TMSA staff, 1 ex. TMSA. – South Africa, Mpumalanga, Richmond Farm, 950 m, XI.–XII.2001, leg. TMSA staff, 2 ex. TMSA. – South Africa, Mpumalanga, Helena Farm, 1090 m, 11.II.2002, leg. TMSA staff, 1 ex. TMSA. – South Africa, Mpumalanga, Der Brochen, 7.XII.2005, leg. J. HARRISON, 1 ex. TMSA. – South Africa, KwaZulu-Natal, Itala NR, 24.XI.2002, leg. J. HARRISON & A. FROLOV, 1 ex. TMSA. – South Africa, KwaZulu-Natal, St. Lucia, Mission Rocks, 9.XII.1975, leg. S. ENDRÖDY-YOUNGA, 2 ex. TMSA. – South Africa, KwaZulu-Natal, Sodwana Bay, 23.XI.1992, leg. S. ENDRÖDY-YOUNGA, 4 ex. TMSA. – South Africa, KwaZulu-Natal, Ndumo NR, 23.XI.2001, leg. P. SCHÜLE, 2 ex. SMNS. – South Africa, KwaZulu-Natal, Ndumo NR, 20.–22.XI.2002, leg. W. SCHAWALLER, 1 ex. SMNS. – South Africa, KwaZulu-Natal, SW Magudu, 4.–5.I.2009, leg. R. MÜLLER & P. SCHÜLE, 1 ex. TMSA, 1 ex. SMNS. – South Africa, KwaZulu-Natal, Hluhluwe, 100 m, 1.I.2009, leg. R. MÜLLER & S. GUSSMANN, 1 ex. TMSA. – South Africa, KwaZulu-Natal, Eshowe, 22.–27.XII.1997, leg. I. JENIŠ, 1 ex. ZSM. – South Africa, Northern Cape, 10 km SE Kimberley, Benfontein NR, 6.II.2009, leg. D. MACFADYEN & R. MÜLLER, 10 ex. TMSA. – South Africa, Northern Cape, 10 km N Kimberley, Dronfield NR, 1300 m, 8.–12.II.2012, leg. R. MÜLLER & W. SCHAWALLER, 3 ex. TMSA, 2 ex. SMNS. – South Africa, Northern Cape, 70 km S Olifantshoek, Witsand NR, 1200 m, 4.–7.II.2012, leg. R. MÜLLER & W. SCHAWALLER, 1 ex. TMSA, 2 ex. SMNS. – Angola, Huila Prov., 10 km SW Cacula, 4.–6.XI.2011, leg. P. SCHÜLE, 14 ex. SMNS. – Angola, Huila Prov., 20 km S Caluquembe, 6.–7.XI.2011, leg. P. SCHÜLE, 1 ex. SMNS.

Type locality: "Insel Sansibar".

Distribution: Tanzania (type locality); Ethiopia, E Congo, Kenya, Angola, Zambia, South Africa (new records).

Uloma rufonotata Ardoin, 1958
(Fig. 4)

Material examined: Congo, Parc National Albert Nord [= North], without date, leg. P. JOLIVET, 1 ♀ SMNS.

Remarks: Male unknown, holotype and a single paratype are said to be females.

Type locality: "N'Kongsamba".

Distribution: Cameroon, Gabon (ARDOIN 1958); Congo (new record).

Uloma scita Walker, 1858
(figures see SCHAWALLER 1996)

Material examined: Seychelles, without further data, leg. A. MERIAN, 1 ex. MNB (det. GEBIEN).

Type locality: "Ceylon".

Distribution: Sri Lanka, Seychelles (GEBIEN 1922); Pakistan, Nepal, N India (SCHAWALLER 1996).

Uloma simplicollis Ardoin, 1962
(Figs. 16, 55–57)

Material examined: Cameroon, Douala, Bois des Singes, XI.1958, leg. J. CANTALOUBE, 1 ex. HNHM, 2 ex. TMSA (erroneously labelled as paratypes). – Cameroon, N'Kongsamba, XI.1958, leg. J. CANTALOUBE, 1 ex. HNHM, 1 ex. TMSA (erroneously labelled as paratypes). – Cameroon, Boumba, Ngoko, Yaounde, X.1962, leg. G. NONVEILLER, 1 ex. HNHM. – Cameroon, Yaounde, Mefou, X.1967, leg. G. NONVEILLER, 1 ex. HNHM. – Ghana, Ashanti Region, Kwadaso, II.–VIII.1969, leg. S. ENDRÖDY-YOUNGA, 5 ex. HNHM, 1 ex. SMNS, 1 ex. TMSA. – Ghana, Ashanti Region, Kumasi, Nhiasu, 330 m, 1967/1968, leg. S. ENDRÖDY-YOUNGA, 2 ex. HNHM. – Ghana, Northern Region, Banda-Nkwanta, 150 m, 1.–7.III.1967, leg. S. ENDRÖDY-YOUNGA, 1 ex. SMNS. – Liberia, Bong Town, 23.III.1988, leg. F.-T. KRELL, 1 ex. SMNS. – Nigeria, Calabar, 5.XI.1955, leg. J. BECHYNÉ, 1 ex. HNHM. – Nigeria, Ile-Ife, 7.–13.VII.1988, leg. F.-T. KRELL, 3 ex. SMNS. – Nigeria, Nsukka, 22.VII.1988, leg. F.-T. KRELL, 1 ex. SMNS. – Togo, Avétonou, 130–150 m, 14.–15.VI.1988, leg. F.-T. KRELL, 2 ex. SMNS. – Congo, Brazzaville, Loudima, 5.XII.1963, leg. S. ENDRÖDY-YOUNGA, 3 ex. HNHM. – Congo, Brazzaville, Orstom Park, 19.XI.1963, leg. S. ENDRÖDY-YOUNGA, 1 ex. HNHM. – Tanzania, Viwenge, Mazombe Ward, 6.–11.I.2009, leg. K. ANGELUS, 1 ♂ CML.

Remarks: ARDOIN (1962) named the species "*simplicollis*", but used in the figure legend "*simplicicollis*". According to ICZN, *simplicollis* is the valid name for this species. The original description specified only a holotype and a single "allotype", i. e. paratype. Some specimens in HNHM, NHMB and TMSA, originating from the type locality, are labelled by ARDOIN as paratypes of "*simplicicollis*", but are not listed as paratypes in the publication, and so do not belong to the type series.

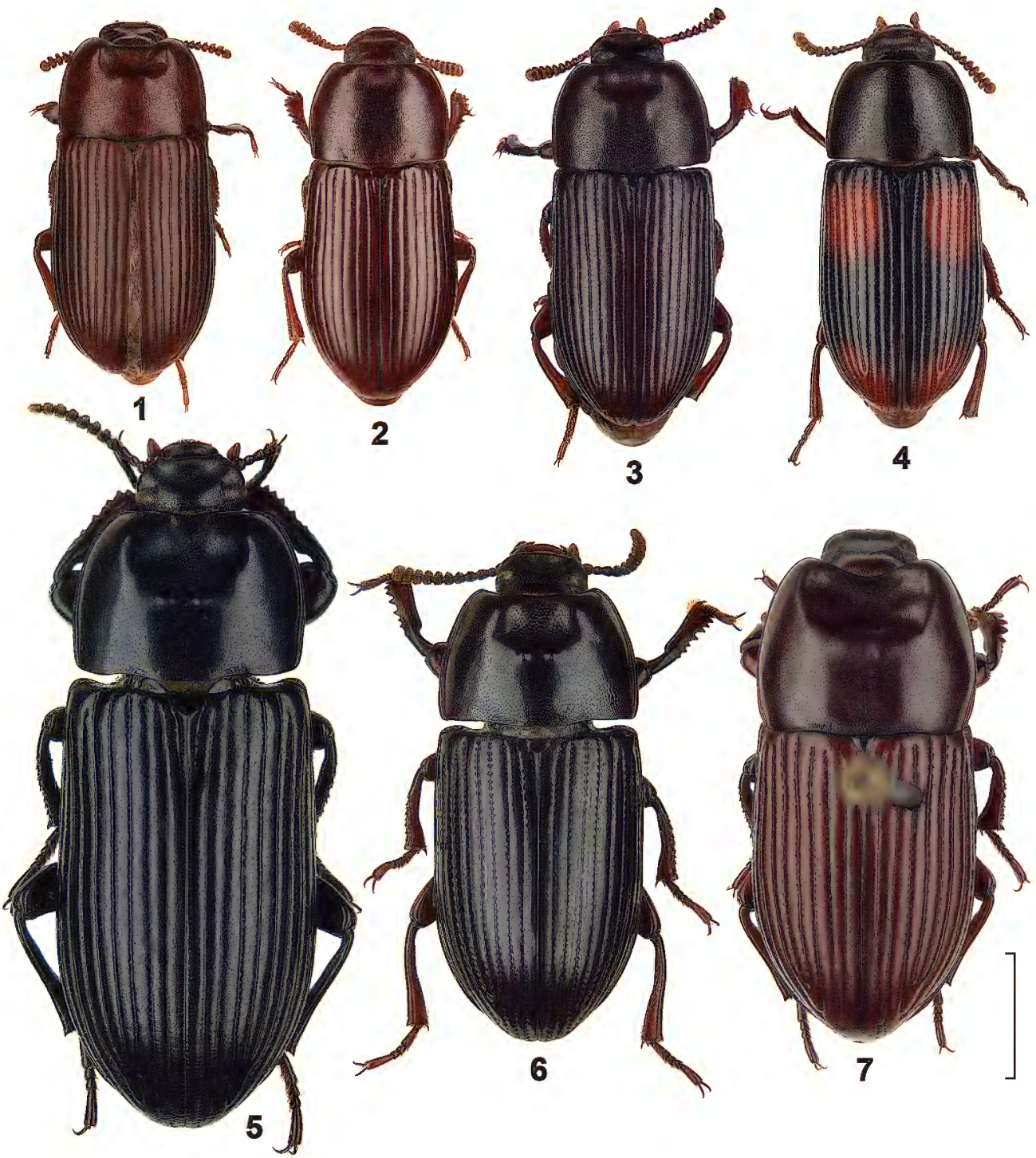
Type locality: "Douala, Bois des Singes".

Distribution: Cameroon, Guinea (ARDOIN 1962, 1963); Congo (KASZAB 1969 under *U.* "*simplicicollis*"); Ghana, Liberia, Nigeria, Togo, Tanzania (new records).

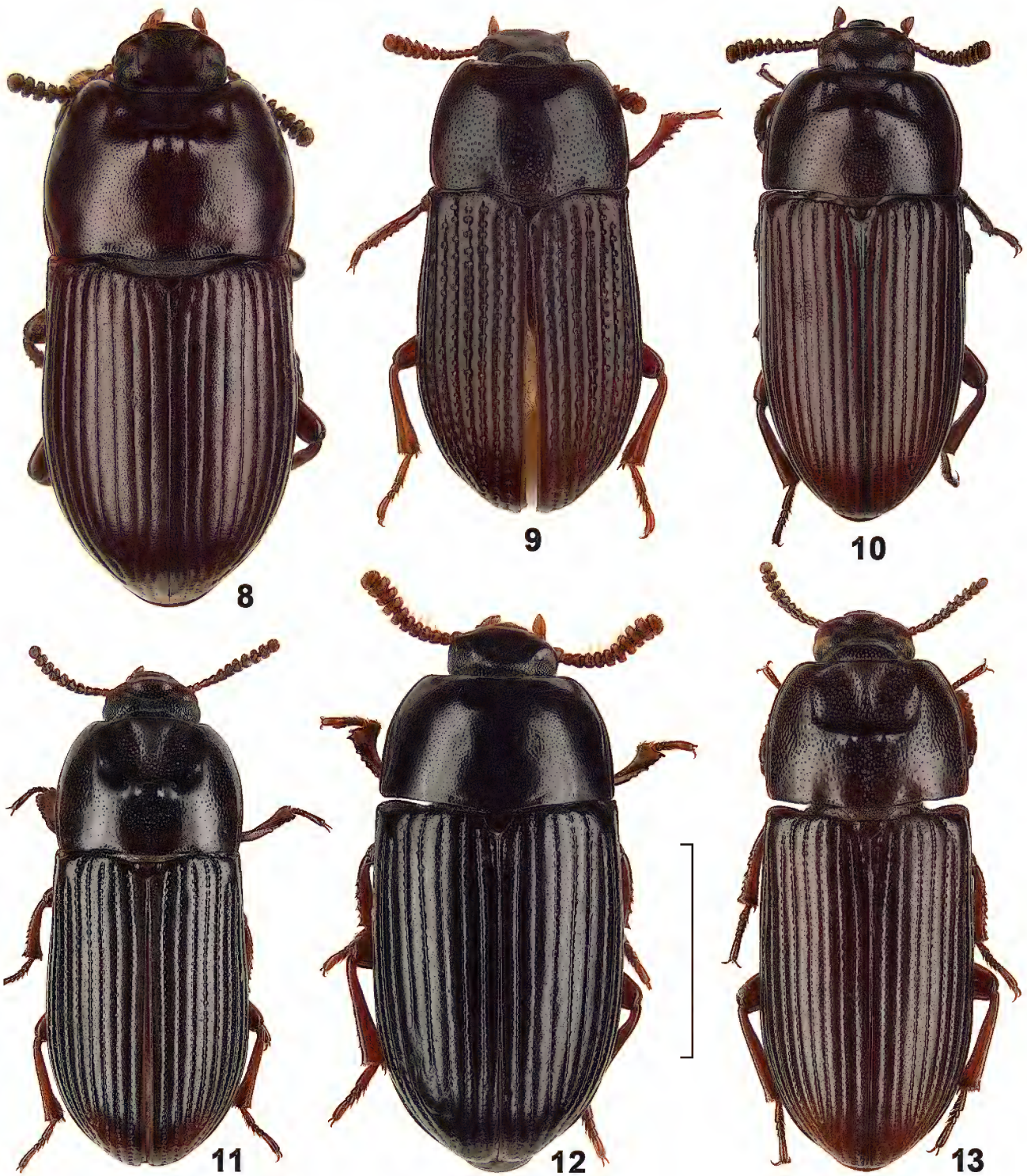
Uloma sjoestedti Gebien, 1904
(Figs. 10, 58–60)

Type material examined: Cameroon, Moliwe near Victoria, without date, leg. Y. SJÖSTEDT, 1 ♂ syntype NHMB, designated herewith as lectotype.

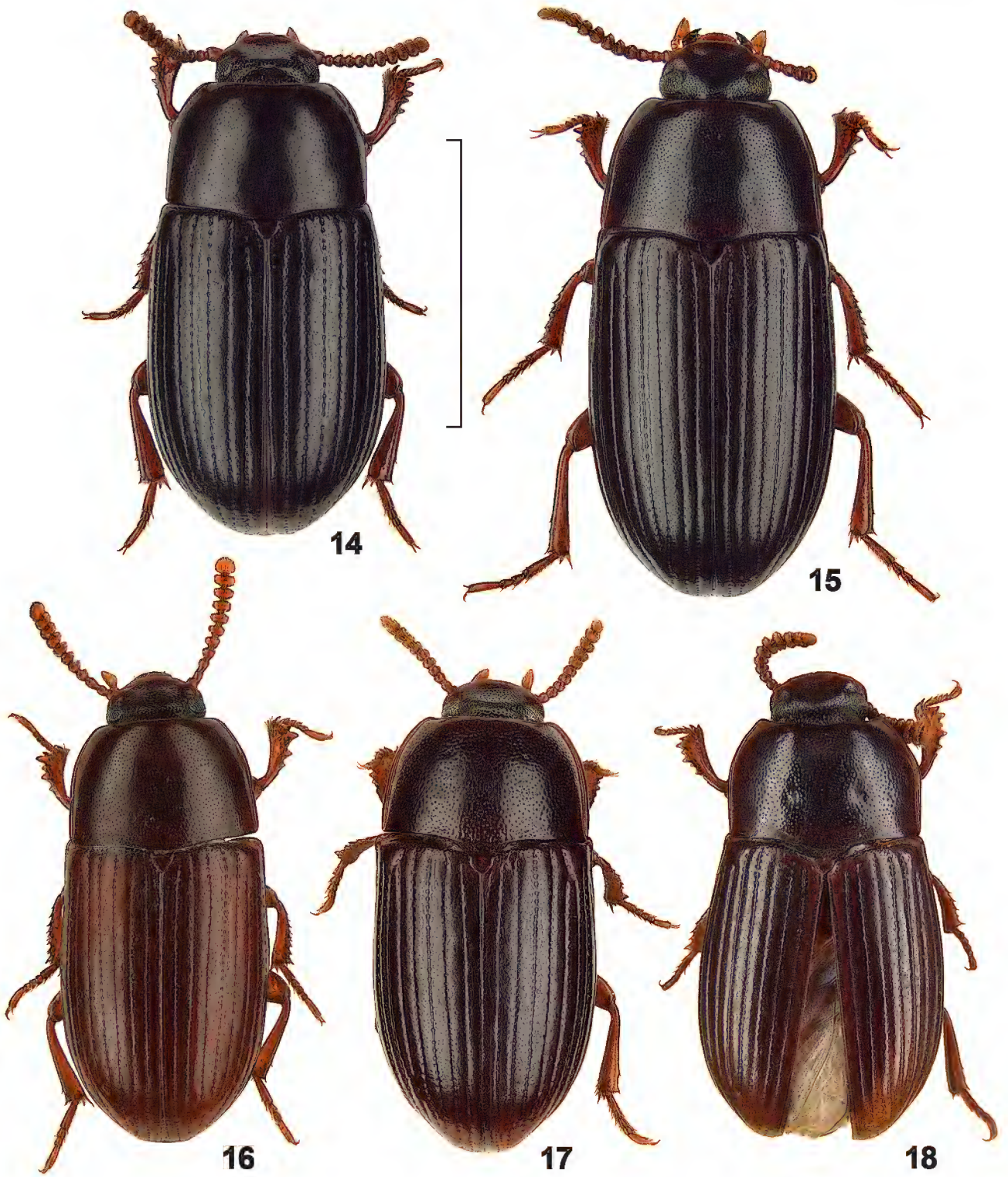
Additional material examined: Congo, W Ruwenzori, Fort Beni, Exped. Herzog A. FRIEDRICH ZU MECKLENBURG, 1 ex. TMSA (det. GEBIEN). – Congo, Kangu Mayombe, without date, leg. PEREGI, 1 ex. SMNS (det. KASZAB). – Congo, Parc Albert (new name: Virunga NP), northern part, without date, leg. P. JOLIVET, 2 ex. TMSA. – Congo, Mayidi, 1945, leg. P. VAN EYEN, 1 ex. SMNS. – Congo, Brazzaville, Lefinie, Mbéokala Forest, 10.I.1964, leg. J. BALOGH & A. ZICSI, 3 ex. HNHM. – Congo, Kangu Mayombe, without date, leg. PEREGI, 1 ex. HNHM. – Congo, Buhunde, Matenda, 28.IX.1929, leg. A. COLLART, 1 ex. HNHM. – Cameroon (labelled as Kamerun), Soppo, II.1912, leg. VON ROTHKIRCH, 7 ex. MNB. – Cameroon (labelled as Kamerun), Soppo, 800 m, XII.1912, leg. VON ROTHKIRCH, 7 ex. MNB. – NW Cameroon, Moliwe near Victoria,



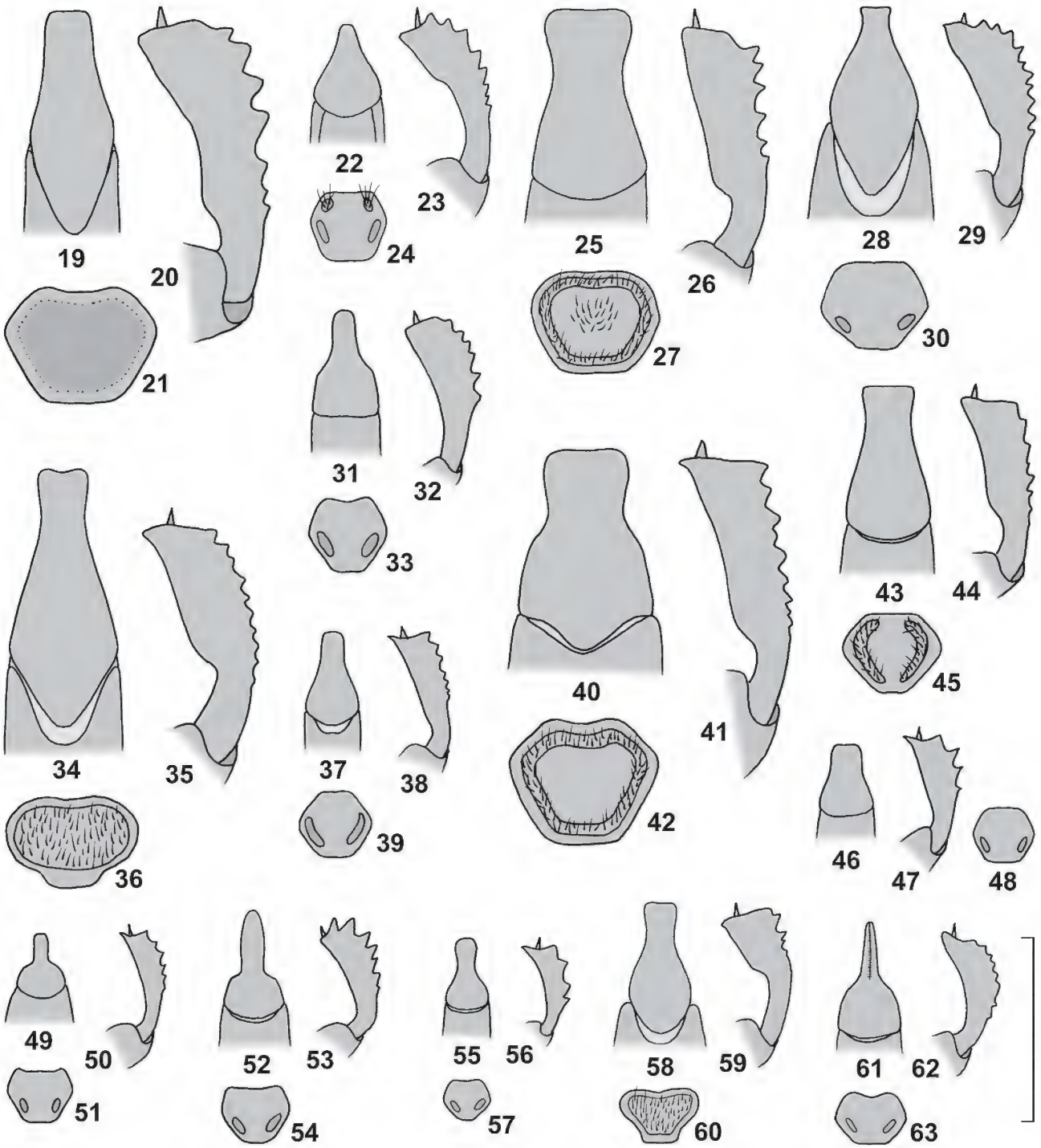
Figs. 1–7. *Uloma* spp., dorsal views. – **1**. *U. collaris*, São Thomé, ♂ lectotype HNHM. **2**. *U. comorensis*, ♀ non-type SMNS. **3**. *U. costae*, São Thomé, ♂ non-type SMNS. **4**. *U. rufonotata*, Congo, ♀ non-type SMNS. **5**. *U. foveicollis*, Congo, ♂ non-type SMNS. **6**. *U. cantaloubei*, Ivory Coast, ♂ non-type HNHM. **7**. *U. basilewskyi*, ♂ paratype HNHM. – Scale: 2 mm.



Figs. 8–13. *Uloma* spp., dorsal views. – **8**. *U. brevipennis*, Tanzania, ♂ non-type SMNS. **9**. *U. crenatostriata*, Seychelles, ♂ non-type HNHM. **10**. *U. sjoestedti*, Togo, ♂ non-type SMNS. **11**. *U. laesicollis*, Togo, ♂ non-type SMNS. **12**. *U. sulcipennis*, Congo, ♂ non-type SMNS. **13**. *U. intrusicollis*, Tanzania, ♂ non-type SMNS. – Scale: 2 mm.



Figs. 14–18. *Uloma* spp., dorsal views. – **14**. *U. pusilla*, South Africa, ♂ non-type SMNS. **15**. *U. obscurina*, Cameroon, ♂ paratype HNHM. **16**. *U. simplicollis*, Ghana, ♂ non-type SMNS. **17**. *U. parva*, Cameroon, ♀ non-type SMNS. **18**. *U. parva*, Congo, ♂ non-type SMNS. – Scale: 2 mm.



Figs. 19–63. *Uloma* spp., apicale of aedeagus, male right anterior tibia, and male mentum. – **19–21**. *U. basilewskyi*, ♂ paratype HNHM. **22–24**. *U. brevipennis*, Tanzania, ♂ non-type SMNS. **25–27**. *U. cantaloubei*, Ivory Coast, ♂ non-type HNHM. **28–30**. *U. collaris*, São Thomé, ♂ lectotype HNHM. **31–33**. *U. crenatostriata*, Seychelles, ♂ non-type HNHM. **34–36**. *U. costae*, São Thomé, ♂ non-type SMNS. **37–39**. *U. laesicollis*, Togo, ♂ non-type SMNS. **40–42**. *U. foveicollis*, Tanzania, ♂ non-type SMNS. **43–45**. *U. intrusicollis*, Mozambique, ♂ non-type TMSA. **46–48**. *U. obscurina*, Cameroon, ♂ non-type HNHM. **49–51**. *U. parva*, Cameroon, ♂ non-type SMNS. **52–54**. *U. pusilla*, South Africa, ♂ non-type SMNS. **55–57**. *U. simplicollis*, Ghana, ♂ non-type SMNS. **58–60**. *U. sjoestedti*, Togo, ♂ non-type SMNS. **61–63**. *U. sulcipennis*, Congo, ♂ non-type HNHM. – Scales: 1 mm (apicale, mentum), 0.5 mm (tibia).

XI.1907–I.1908, leg. Frfr. von Maltzan, 2 ex. MNB. – Cameroon, Joh.-Albrechtshöhe, V.–VIII.1898, leg. L. Conradt, 3 ex. MNB. – Cameroon, N'Kongsamba, VI./VII.1957, collector unknown, 6 ex. HNHM, 6 ex. TMSA. – Cameroon, South West Prov., Mt. Cameroon, Buea, hut 1 region, 1800 m, 28.II.–3.III.2008, leg. M. Řiha, 16 ex. SMNS. – Togo, Plareaux Region, Kloto, Forêt Classée de Missahoe, 2.II.–17.III.2012, leg. A. Mensah, 1 ex. SMNS. – Ghana, Ashanti Region, Mampong, 600 m, 8.VIII.1965, leg. S. Endrődy-Younga, 2 ex. HNHM. – Ghana, Volta Region, Amedzofe, 1.IX.1967, leg. S. Endrődy-Younga, 1 ex. TMSA. – Rwanda, Shangugu, 1960, leg. L. Birari, 18 ex. HNHM. – Rwanda, Ihembe, 10.III.1960, leg. P. Donis, 4 ex. HNHM. – Rwanda, Nyakabuye, 15.VII.1984, leg. H. Mühle, 1 ex. HNHM.

Type locality: "Moliwe".

Distribution: Cameroon (Gebien 1904); Congo (Ardoin 1965, Kaszab 1969); Guinea (Ardoin 1963); Ivory Coast (Gridelli 1954, Ardoin 1969); Togo, Ghana, Rwanda (new records).

Uloma sulcipennis (Thomson, 1858) (Figs. 12, 61–63)

Heterophaga sulcipennis Thomson, 1858.
Alphitobius sulcipennis (Thomson, 1858) (Ardoin 1963).
Uloma pachycera Gebien, 1921 syn. (Ardoin 1963).

Type material examined: Fernando-Poo, Musola, 500–800 m, I.–III.1902, leg. L. Fea, 1 ♂ syntype of *pachycera* NHMB, designated herewith as lectotype.

Additional material examined: NW Cameroon, Moliwe near Victoria, XI.–XII.1907, leg. Frfr. von Maltzan, 6 ex. MNB. – Cameroon, Bibundi, 1.–15.IX.1904, leg. G. Tessmann, 3 ex. MNB. – Cameroon, Johann-Albrechtshöhe, 1895, leg. L. Conradt, 1 ex. MNB. – Cameroon, Yabassi, V.1957, leg. J. Cantaloube, 1 ex. HNHM (*pachycera* det. Kulzer). – Cameroon, Nanga Eboko, III.–IV.1959, leg. R. Lenczy, 1 ex. HNHM. – Cameroon, without further data, 2 ex. HNHM. – Congo, Kindamba, Méya, Bangou Forest, 4. & 9.XI.1963, leg. S. Endrődy-Younga, 2 ex. HNHM. – Congo, Sibiti, 29.XI.1963, leg. J. Balogh & A. Zicsi, 1 ex. HNHM. – Congo, Yangambi, 1.–5.IX.1954, leg. H. Franz, 1 ex. SMNS.

Type localities: "Gabon" (*U. sulcipennis*), "Fernando-Poo" (= Bioko) (*U. pachycera*).

Distribution: Gabon (type locality); Equatorial Guinea, Cameroon (Gebien 1921); Guinea (Ardoin 1963); Congo (Kaszab 1969).

3 Key to the African species of *Uloma* (without islands)

The following key is suitable for males only (to be recognised by dissection of the aedeagus). The male of *U. rufonotata* is unknown, but the species is nevertheless included. Not included in this key are four species (from Madagascar, Mauritius, Rodrigues Island, Seychelles, Comores and Zanzibar in the Indian Ocean) which can easily be identified by their distributional pattern [*U. comorensis* Gebien, 1922, *U. crenatostriata* Fairmaire, 1868, *U. polita* (Wiedemann, 1821), and *U. scita* Walker, 1858]. Also omitted are two taxa of doubtful status [*U. fastidiosa* Fairmaire, 1882, and *U. owariensis* (Palisot de Beauvois, 1805)].

1 Last abdominal ventrite distinctly bordered, larger species (body length 13–16 mm) **2**
– Last abdominal ventrite unbordered, smaller species (body length 12 mm or less) **3**
2 Body blackish, male mentum with a complete garland of setae but disc bare, apicale of aedeagus shorter. – Figs. 5, 40–42. ..... ***foveicollis***
– Body brownish, male mentum with a complete garland of setae and also disc with setation, apicale of aedeagus longer. – Figs. 6, 25–27. ..... ***cantaloubei***
3 Elytra bicoloured dark with reddish spots in the humeral region and at tip. – Fig. 4 (male unknown). ..... ***rufonotata***
– Dorsal surface of pronotum and elytra completely unicoloured brownish or blackish. **4**
4 Male pronotum anteriorly without any excavation, or at most with a weak median impression, elytra ovate (five similar species, to be identified only by examination of the aedeagus). **5**
– Male pronotum anteriorly with distinct excavation, elytra ovate or elongate parallel. **9**
5 Male pronotum anteriorly with a weak median impression. **6**
– Male pronotum without any impression. **7**
6 Body length around 5 mm, finger-like process of aedeagal apicale shorter and without longitudinal keel. – Figs. 17, 18, 49–51. ..... ***parva***
– Body length around 8 mm, finger-like process of aedeagal apicale long and with longitudinal keel. – Figs. 12, 61–63. ..... ***sulcipennis***
7 Apicale of aedeagus with a broad base and a finger-like process. – Figs. 14, 52–54. ..... ***pusilla***
– Apicale of aedeagus of different shape (Figs. 46, 55). **8**
8 Apicale of aedeagus prolonged and with a rounded tip. – Figs. 16, 55–57. ..... ***simplicollis***
– Apicale of aedeagus short and with a truncate tip. – Figs. 15, 46–48. ..... ***obscurina***
9 Male anterior tibia with the inner margin distinctly and abruptly widened in the distal half (Figs. 23, 59). **10**
– Male anterior tibia with the inner margin at most on distal two-thirds widened (Figs. 29, 35, 38). **11**
10 Body elongate parallel, apicale of aedeagus with truncate tip, male mentum nearly completely covered with denser setation. – Figs. 10, 58–60. ..... ***sjoestedti***
– Body ovate, apicale of aedeagus with rounded tip, male mentum only with a few setae in impressions. – Figs. 8, 22–24. ..... ***brevipennis***
11 Body length around 7–8 mm, elytra elongate parallel (Figs. 11, 13). **12**
– Body length 9–14 mm, elytra ovate (Figs. 1, 3, 7). **13**
12 Apicale of aedeagus with a truncate tip, male mentum with an interrupted garland of setae. – Figs. 13, 43–45. ..... ***intrusicollis***
– Apicale of aedeagus with a rounded tip, male mentum with two impressions without setae. – Figs. 11, 37–39. ..... ***laesicollis***
13 Body length 11.5–14.0 mm, apicale of aedeagus with a parallel-sided truncate tip, male mentum with a median impression without setae. – Figs. 7, 19–21. ..... ***basilewskyi***
– Body length 9–11 mm, apicale of aedeagus with a widened truncate tip, male mentum different. **14**
14 Male mentum with two small impressions without setae. – Figs. 1, 28–30. ..... ***collaris***
– Male mentum nearly completely covered with denser setation. – Figs. 3, 34–36. ..... ***costae***

4 New combinations

Cenoscelis maculipennis (Grimm, 2002) **n. comb.**

Eutochia maculipennis Grimm, 2002.

Type material examined: Gambia, Kololi, 6.–19.VII.2000, leg. R. Grimm, holotype ZSM.

Additional material examined: Ghana, Ashanti Region, Kwadaso, 320 m, 26.II.1969, leg. S. Endrödy-Younga, 9 ex. HNHM (det. Kaszab as "*Uloma platydemoides* Ardoin", unpublished name). – Cameroon, Nanga Eboko, VII.–X.1959, leg. R. Lenczy, 1 ex. HNHM. – Benin, 15 km N Tangueta, 28.–29.VI.2001, leg. F. & L. Kantner, 1 ex. SMNS. – Benin, Save, 18.–20.VI.2001, leg. F. & L. Kantner, 1 ex. SMNS.

Remarks: Doyen (1985) showed, that *Eutochia* applies only to the New World species, and that the Old World species belong to *Cenoscelis*. Grimm (2002) compared *maculipennis* with *Eutochia pumilio* Bremer, 2001 (see below as synonym of *Cenoscelis minuscula*), and with the widespread *C. pulla* (Erichson, 1843) (Schawaller et al. 2013).

Distribution: Gambia (type locality); Ghana, Benin, Cameroon (new records).

Cenoscelis minuscula (Ardoin, 1969) **n. comb.**

Uloma minuscula Ardoin, 1969.
Eutochia pumilio Bremer, 2001 **n. syn.**

Type material examined: Ivory Coast, Ferkessédougou, 10.–20.V.1964, leg. J. Decelle, ♀ holotype of *minuscula* MRAC. – Sudan, North Dafur Prov., El Geneina, 13.IX.1979, leg. I. M. Abuzinid, 1 paratype of *pumilio* SMNS.

Additional material examined: Ivory Coast, Kafolo/Comoé, 27.IV.1988, leg. F.-T. Krell, 1 ex. SMNS.

Remarks: Ardoin (1969) placed his *Uloma minuscula* only preliminarily to *Uloma* because of the small body size, the long antennae, and the undentate anterior tibiae. However, these characters fully coincide with the genus *Cenoscelis* Wollaston, 1867, thus *U. minuscula* is excluded herein from *Uloma* and transferred to *Cenoscelis*. Bremer (2001) described *Eutochia pumilio* from Sudan and other countries. Reexamination of type specimens revealed its junior synonymy with *Cenoscelis minuscula* (Ardoin 1969).

Type localities: "Ferkessédougou" (*U. minuscula*), "El Geneina" (*E. pumilio*).

Distribution: Ivory Coast, Chad, Senegal (Ardoin 1969); Mali, Sudan, Ghana, Gambia (Bremer 2001).

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Four new species of the genus *Sclerum* Dejean (Coleoptera: Tenebrionidae: Opatrini) from South East Asia

Roland Grimm

Abstract

The following new species of the genus *Sclerum* Dejean, 1834 are described: *S. impressicolle* **n. sp.**, *S. impressifrons* **n. sp.**, *S. laoticum* **n. sp.**, and *S. sinuatocolle* **n. sp.** New synonym: *Sclerum elongatulum* (Chatanay, 1917) **n. syn.** = *S. ferrugineum* (Fabricius, 1801). Lectotypes are designated for *Opatrum ferrugineum* Fabricius, 1801, *Scleron denticolle* Fairmaire, 1882, *Scleron discicolle* Reitter, 1904, and *Scleron elongatulum* Chatanay, 1917. New faunistic data of *Sclerum ferrugineum* (Fabricius, 1801) are given.

Key words: Tenebrionidae, Opatrini, *Sclerum*, Asia, new species, lectotype designation, new synonym, new records.

Zusammenfassung

Folgende neue Arten der Gattung *Sclerum* Dejean, 1834 werden beschrieben: *S. impressicolle* **n. sp.**, *S. impressifrons* **n. sp.**, *S. laoticum* **n. sp.** und *Sclerum sinuatocolle* **n. sp.** Neues Synonym: *Sclerum elongatulum* (Chatanay, 1917) **n. syn.** = *S. ferrugineum* (Fabricius, 1801). Lectotypen werden für *Opatrum ferrugineum* Fabricius, 1801, *Scleron denticolle* Fairmaire, 1882, *Scleron discicolle* Reitter, 1904 und *Scleron elongatulum* Chatanay, 1917 designiert. Neunachweise für *Sclerum ferrugineum* (Fabricius, 1801) werden gegeben.

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1 Introduction

The Oriental species of the genus *Sclerum* Dejean, 1834 (Tenebrioninae Latreille, 1802, Opatrini Brullé, 1832) were treated by Kaszab (1942) under the preoccupied name *Scleron* Hope, 1840. Newly collected material in Southeast Asia included different species related to *S. elongatulum* in the sense of Kaszab (1942: fig. 2). The comparison with type specimens revealed that Kaszab (1942) misinterpreted *S. elongatulum* (Chatanay, 1917). In the present paper four new species of *Sclerum* are described, a new synonym is proposed, and new faunistic data of *Sclerum ferrugineum* (Fabricius, 1801) are given. Photographs of the discussed species including their aedeagi are added and an identification key is provided.

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Acronyms of depositories

CML	Collection Martin Lillig, Saarbrücken, Germany
CRG	Collection Dr. Roland Grimm, Neuenbürg, Germany
HNHM	Hungarian Natural History Museum, Budapest, Hungary (Dr. Ottó Merkl)
MNHN	Muséum National d'Histoire Naturelle, Paris, France (Dr. Antoine Mantilleri)
NBCN	Naturalis Biodiversity Center, Leiden, The Netherlands (Drs. Ron Felix, Pasquale Ciliberti)
NHMB	Naturhistorisches Museum Basel, Switzerland (Dr. Eva Sprecher)
NHMW	Naturhistorisches Museum Wien, Austria (Dr. Harald Schillhammer)
SMNS	Staatliches Museum für Naturkunde, Stuttgart, Germany (Dr. Wolfgang Schawaller)
ZMUC	Zoological Museum of the University Copenhagen, Copenhagen, Denmark (Drs. Alexey Solodovnikov, Sree G. Selvantharan)
ZSM	Zoologische Staatssammlung Munich, Germany (Dr. Michael Balke)

2 The species

Sclerum ferrugineum (Fabricius, 1801) (Figs. 4, 6)

Opatrum ferrugineum Fabricius, 1801 (Fabricius 1801: 118)
Opatrum tuberculatum Besser, 1832 (Besser 1832: 18); Gebien (1938: 419, syn.)
Scleron denticolle Fairmaire, 1882 (Fairmaire 1882: 219); Gebien (1906: 217, syn.)
Scleron discicolle Reitter, 1904 (Reitter 1904: 125); Gebien (1906: 217, syn.)
Scleron elongatulum Chatanay, 1917 (Chatanay 1917: 235), **n. syn.**

Type material studied

The type series of *Opatrum ferrugineum* Fabricius, 1801 consists of three specimens with the following labels: First specimen: 19. *ferrugineum* [handwritten on white paper with black frames], *Opatrum ferrugineum* [handwritten by Fabricius on white paper], designated herewith as lectotype (ZMUC, formerly Kiel collection). – Second specimen (paralectotype): Java., Mus: T: Lund, *Opatrum ferrugineum* F. [handwritten on white paper with black frames], Type [printed on red label], green square label without text, ZMUC 00508640 [printed on white label]. – Third specimen (paralectotype): Type [printed on red label], green square label without text, ZMUC 00508641 [printed on white label].

Two syntypes of *Scleron denticolle* Fairmaire, 1882 have the following labels: First specimen: type [handwritten on white label], *Scleron denticolle* "n. sp.? [illegible]" [handwritten on white label by Fairmaire], Sum. Exp., Rawas, 5/78 [handwritten on round, white label], Ravas, 5.78 [handwritten on white, square label with black frames], red square label without text; designated herewith as lectotype (NBCN). – Second specimen (paralectotype): type [handwritten on white label], J. C. van Hasselt, Boenga Maes, Palemb. [handwritten on round, white label], red square label without text (NBCN).

Five syntypes of *Scleron discicolle* Reitter, 1904 have the following labels: First specimen: Fieber, Mulmein, 1871. [handwritten on white label], *Scleron discicollis* [sic!] m. 1903 [handwritten on white label by Reitter], designated herewith as lectotype (NHMW). – Second specimen (paralectotype): Fieber, Mulmein, 1871. [handwritten on white label], *Scleron discicollis* [sic!] m. 1903 [handwritten on white label by Reitter] (NHMW). – Third specimen (paralectotype): Knb, b [handwritten on white label], *Scleron discicollis* [sic!] m. 1903 [handwritten on white label by Reitter] (NHMW). – Fourth specimen (paralectotype): *Scleron discicollis* [sic!] m. 1903 [handwritten on white label by Reitter] (NHMW). – Fifth specimen (paralectotype): *Tuberculatum*, Ind. Or., Ziegl. [handwritten on white label] (NHMW).

Two syntypes of *Scleron elongatulum* Chatanay, 1917 have the following labels: First specimen: Rangoon [handwritten on white mounting card], Type [printed on red label], Museum Paris, Coll. J. Chatanay 1914 [printed on white label with black frame], *Scleron elongatulum* n. sp. [handwritten on white mounting card], designated herewith as lectotype (MNHN). – Second specimen (paralectotype): Rangoon [handwritten on white mounting card], Paratype [printed on red label], Museum Paris, Coll. J. Chatanay 1914 [printed on white label with black frame], *Scleron elongatulum* n. sp. [handwritten on white mounting card] (MNHN).

Additional material studied

Oman, Al Misfah, 23°14′N 58°82′E, 28.III.1996, H. J. Bremer leg., 2 ex. (ZSM). – [India], Andaman Is., Port Blair, South Point, 24.XII.1978, Oxelle [?] leg., 1 ex. (HNHM). – Nepal, Lumbini Dumkibas, Binai River, 27°34′36″N 83°52′18″E, 150 m, 14.VII.2001, A. Weigel leg., 2 ex. (SMNS). – Nepal centr., Sauraha, Nat. Park Chitwan, 20.–25.V.1992, I. Jeniš leg., 1 ex. (CRG). – [Myanmar], Da Yenang Young, Mandalay, 21.–26.V.1885, Fea leg., 2 ex. (HNHM). – Myanmar (labelled as Birmania), Bhamo, III.1885, Fea leg., 6 ex. (HNHM). – Same data, but VIII.1885, Fea leg., 1 ex. (HNHM). – Myanmar (labelled as Birma), Rangoon, Imyalate, 30.VIII.1978, X. Bellés leg., 1 ex. (HNHM). – [Myanmar], Tenasserim, Mus. Pragae, Coll. Helfer, 2 ex. (HNHM). – Myanmar (labelled as Birma), Pegu, no date and collector stated, 1 ex. (ZSM). – [Myanmar], Pegu, no date and collector stated, 1 ex. (SMNS). – Myanmar centr. (labelled as Burma), Mandalay, 20.IX.1984, D. Grohmann leg., 1 ex. (SMNS). – Myanmar (labelled as Burma), Mandalay Division, Bagan (Pagan), Nyaung-u, 29.–31.V.1997, J. Rejsek leg., 3 ex. (SMNS). – Myanmar (labelled as Burma), W Mandalay Division, Bagan, Nyaung-u, 29.–31.V.1997, J. Kaláb leg., 1 ex. (ZSM). – C Myanmar, Mandalay Div., Old Bagan City, V.2005, M. Hackel & B. Břzina leg., 1 ex. (SMNS). – Myanmar, SW Shan State, N of Inle Lake, Nyaungshwe, 7.–16.VI.1997, J. Kaláb leg., 1 ex. (ZSM). – Myanmar, SW Shan State, Taunggyi, 1.–18.VI.1997, J. Rejsek leg., 3 ex. (SMNS). – Myanmar, SW Shan State, Taunggyi, 20°50′N 97°00′E, 1.–18.VI.1997, J. Kaláb leg., 12 ex. (CML). – NW Thailand, Mae Hong Son, 18.–19.XI.1998, R. Grimm leg., 6 ex. (CRG). – Same data, but 17.–18.V.1999, R. Grimm leg., 2 ex. (CRG). – Same data, but 14.–16.V.2006, R. Grimm leg., 1 ex. (CRG). – Same data, but 29.IV.1992, J. Horák leg., 1 ex. (ZSM). – NW Thailand, Mae Hong Son Prov., Mae Sariang, 20.XI.1998, R. Grimm leg., 1 ex. (CRG). – NW Thailand, Mae Hong Son Prov., Ban Huai Po, 1600–2000 m, 9.–16.V.1991, J. Horák leg., 15 ex. (ZSM), 2 ex. (CRG). – NW Thailand, Mae Hong Son Prov., Huai Suai Tao, 11.–17.V.1992, L. Dembický leg., 1 ex. (ZSM). – NW Thailand, Mae Hong Son Prov., Soppong (Pangmapa), 4.V.2004, R. Grimm leg., 4 ex. (CRG), 2 ex. (SMNS). – NW Thailand, Mae Hong Son Prov., Soppong, 750 m, 19°27′N 98°20′E, 10.–13.V.1993, L. Bocák leg., 1 ex. (CML), 2 ex. (SMNS). – Same data, but V. Kubáň leg., 14 ex. (SMNS). – NW Thailand, Mae Hong Son Prov., Soppong-Pai, 19°27′N 98°20′E, 1500 m, 7.–12.V.1996, J. Horák leg., 5 ex. (ZSM). – NW Thailand, Mae Hong Son Prov., 6 km E Pai, 16.XI.1998, R. Grimm leg., 8 ex. (CRG), 10 ex. (SMNS). – NW Thailand, Mae Hong Son Prov., 5 km E Pai, 700 m, 19.IV.2004, W. Schawaller leg., 2 ex. (SMNS). – NW Thailand, Mae Hong Son Prov., Pai, 16.–17.XI.1998, R. Grimm leg., 13 ex. (CRG), 13 ex. (CML), 1 ex. (ZSM). – Same data, but 17.–19.IV.2004, R. Grimm leg., 1 ex. (CRG). – Same data, but 15.–16.V.1999, R. Grimm leg., 1 ex. (CRG). – Same data, but 18.V.2006, R. Grimm leg., 1 ex. (CRG). – NW Thailand, Mae Hong Son Prov., Pai, Thapai Hot Springs, 6.V.2004, R. Grimm leg., 5 ex. (CRG), 2 ex. (SMNS). – N Thailand, Chiang Rai, 25.XI.1998, R. Grimm leg., 1 ex. (CRG). – Same data, but 20.–21.V.1999, R. Grimm leg., 1 ex. (CRG). – NW Thailand, Chiang Mai Prov., Ban San Pakia, 1700 m, 25.IV.–7.V.1996, S. Bílý leg., 5 ex. (ZSM). – Thailand, Chiang Mai Prov., Doi Inthanon, Bang Khu Klong, 1200 m, 21.V.–5.VI.1983, Malicky leg., 1 ex. (CRG). – Thailand, Chiang Mai Prov., N Chiang Mai, 8 km NE Mae Malai, W Cho Lae, 14.V.1991, R. Grimm leg., 3 ex. (CRG). – Thailand, Chiang Mai Prov., 41 km N Chiang Mai, 18.VIII.1995, R. Grimm leg., 6 ex. (CRG). – Thailand, Chiang Mai Prov., NNW Chiang Mai, W Mae Taeng, Ban Huai Bong, 15.V.1999, R.

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(CRG). – Thailand, Chiang Mai Prov., 10 km E Chiang Mai, 24.XII.1994, R. GRIMM & A. RACHINSKY leg., 1 ex. (CRG). – Thailand, Chiang Mai Prov., Chom Thong, 24.–27.IV.1991, J. HORÁK leg., 6 ex. (ZSM), 1 ex. (CRG). – Thailand, Lampang Prov., NW Lampang, Elephant Conservation Centre, 25.XII.1994, R. GRIMM & A. RACHINSKY leg., 2 ex. (CRG). – Thailand, 80 km SE Lampang, 17°37′55″N 99°14′16″E, 15.IV.2003, J. SCHÖNFELD leg., 1 ex. (SMNS). – Thailand, NE San Kamphaeng, Roong Aroon Hot Springs, 28.V.1999, R. GRIMM leg., 2 ex. (CRG). – Thailand, Kamphaeng Phet, 5.XII.2001, R. GRIMM leg., 3 ex. (CRG). – W Thailand, Uthai Thani Prov., 3 km W Ban Rai, I.1992, THIELEN leg., 24 ex. (CRG). – Thailand, Phrae Prov., Amphoe Wang Ching, Ban Den, 200 m, 26.–29.XII.1988, TRAUTNER & GEIGENMÜLLER leg., 1 ex. (SMNS). – Thailand, Sukhotai Prov., Old Si Sanchanalai, 25.V.1999, R. GRIMM leg., 1 ex. (CRG). – Thailand, Sukhotai Prov., Old Sukhotai, 26.V.1999, R. GRIMM leg., 2 ex. (CRG). – Thailand, Sukhotai, 25.–26.V.1999, R. GRIMM leg., 1 ex. (CRG). – Thailand, Ayuthaya, Wat Srisanpeth, 14°21′2″N 100°33′34″E, 14.IV.2003, J. SCHÖNFELD leg., 1 ex. (SMNS). – Thailand, Nakhon Ratchasima Prov., Pak Thong/Khao Yai, 14°50′N 102°44′E, 25.VIII.1996, M. HAUSER leg., 3 ex. (SMNS). – Thailand, NW Nakhon Sawan, Khao Noh, 29.XI.2001, R. GRIMM leg., 4 ex. (CRG), 1 ex. (CML). – Thailand, Chaiyaphum Prov., Tad Tone Nat. Park, 4.XII.2001, R. GRIMM leg., 1 ex. (CRG). – W Thailand, Kanchanaburi, 31.III.–1.IV.1994, J. HORÁK leg., 10 ex. (ZSM). – Thailand, Kanchanaburi, 150 m, 14°02′N 99°31′E, 3.–7.IV.1991, V. KUBÁŇ leg., 1 ex. (ZSM). – Same data, but S. BÍLÝ leg., 1 ex. (CRG). – W Thailand, Kanchanaburi Prov., Sangkhlaburi, XI.1994, J. REJSEK leg., 3 ex. (SMNS). – Thailand, Kanchanaburi Prov., Erawan Nat. Park, Erawan Waterfall, 14.II.1994, S. & L. MAHUNKA leg., 1 ex. (HNHM). – N Thailand, Nan, 23.–24.XI.1998, R. GRIMM leg., 11 ex. (CRG), 3 ex. (CML), 21 ex. (SMNS), 1 ex. 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Borneo, Malaysia, Sabah, Batu Punggul Resort, 24.VI.–1.VII.1996, J. Kodada leg., 2 ex. (SMNS). – Indonesia, Sulawesi (labelled as Celebes), location illegible, no date stated, O. Beccari leg., 2 ex. (ZSM). – Indonesia, Sulawesi, Pandang, 5.VII.1996, Schüle & Stüben leg., 2 ex. (SMNS). – Indonesia, Java centr., 30 km SW Yokyakarta, secondary forest, 15.III.1995, H. J. Bremer leg., 2 ex. (ZSM). – Indonesia, Bali, Margarena, 15 km E Gilimanuk, 22.II.1994, Bolm leg., 1 ex. (SMNS). – Indonesia, Bali, Sanur, 9.–22.XII.2007, R. Grimm leg., 1 ex. (CRG). – Indonesia, Lombok, Senaro, N slope of Rinjani, 1100 m, 2.–5.II.1994, Bolm leg., 8 ex. (SMNS). – Indonesia, NE Sumbawa, Calabai, Tambora Nat. Park, 11.–13.II.1994, Bolm leg., 2 ex. (SMNS). – [Indonesia], Saleyer, XII.1880, H. E. D. Engelhard leg., 1 ex. (NBCN). – [Indonesia, Java], Jakarta (labelled as Batavia), Sythoff leg., 1 ex. (NBCN). – [Indonesia, Java], Jakarta (labelled as Batavia), II.1949, C. v. Nidek leg., 1 ex. (NBCN). – [Indonesia], Java, Ardjoena, Hekmeyer leg., 2 ex. (NBCN). – [Indonesia], Poeloe-Katela, 23.–28.XI.1880, H. E. D. Engelhard leg., 1 ex. (NBCN). – [Indonesia], Java, Banjoewangi, 1909, MacGillavry leg., 2 ex. (NBCN). – [Indonesia], Java, Djokjakarta, 1933, H. Overbeck leg., 2 ex. (NBCN). – [Indonesia], Kisser-Ins. [I. Kisar NE Timor], V.1901, 1 ex. (HNHM).

Synonymy

Chatanay (1917) separated *Sclerum elongatulum* (Chatanay, 1917) from *Sclerum ferrugineum* (Fabricius, 1801) mainly by the small body size. The body size of *Sclerum ferrugineum* (Fabricius, 1801) is highly variable: body length 5.2–7.1 mm, body width 2.3–3.1 mm. The study of type-specimens of *S. elongatulum* revealed that these are smaller (body length 5.7–6.0 mm, body width 2.3–2.6 mm) specimens of Fabricius' (1801) *S. ferrugineum*, so *S. elongatulum* is considered as a junior synonym of *S. ferrugineum*.

Distribution

India; Indonesia: Java, Sumatra, Sumbawa; Myanmar; Nepal; Philippines: Mindoro, Luzon; "S. China"; Taiwan; Vietnam (Chatanay 1917, Fabricius 1801, Fairmaire 1882, 1893, Kaszab 1942, Löbl & Smetana 2008, Reitter 1904, Schawaller 2012). E Malaysia; Indonesia: Bali, Kisar, Sulawesi, Selayar; Oman; Thailand (new records).

Sclerum impressicolle **n. sp.**
(Figs. 3, 7)

Holotype ♂: NW Thailand, Mae Hong Son, 18.XI.1998, R. Grimm leg. (CRG).

Paratypes: Same data as holotype, but 17.–18.V.1999, R. Grimm leg., 2 ♀♀ (CRG). – Thailand, Doi Mae Ya, 19°16′N 98°35′E, 19.V.1993, V. Kubáň leg., 1 ex. (SMNS). – Thailand, Soppong, 750 m, 19°29′N 98°18′E, 13.V.1993, L. Bocák leg., 2 ex. (CML). – Thailand, Soppong, 1500 m, 19°27′N 98°20′E, 10.–13.V.1993, L. Bocák leg., 2 ex. (CRG), 11 ex. (SMNS). – Same data, but V. Kubáň leg., 3 ex. (CRG), 3 ex. (HNHM), 25 ex. (SMNS). – NW Thailand, Mae Hong Son Prov., Soppong-Pai, 19°27′N 98°20′E, 1500 m, 7.–12.V.1996, J. Horák leg., 4 ex. (ZSM). – NW Thailand, Mae Hong Son Prov., Ban Huai Po, 1600–2000 m, 9.–16.V.1991, J. Horák leg., 6 ex. (ZSM), 1 ex. (CRG). – NW Thailand, Chiang Mai Prov., Ban San Pakia, 1700 m, 25.IV.–7.V.1996, S. Bílý leg., 2 ex. (ZSM). – Thailand, Chiang Mai Prov., Chom Thong, 24.–27.IV.1991, J. Horák leg., 1 ex. (ZSM). – [India], Calcutta, no date and collector stated, 1 ex. (HNHM).

Etymology

Impressus (Lat.) = impressed combined with collum (Lat.) = neck (refers in this case to the pronotum).

Description

Oblong, subparallel-sided, ferruginous, whole surface rather densely micro-granulate, matt to faintly shining. Body length 4.8–5.5 mm, body width 2.1–2.5 mm.

Head widest at middle of rounded genae and here somewhat wider than at eye level; anterior boder of clypeus arcuate from gently notched clypeo-genal meeting to V-shaped emargination in the middle; between clypeus and frons with transversal elevation, behind this broadly, transversely furrowed; at the inner border of eyes with high elevation; in the middle between the eye elevations with elevation composed of high tubercles. Surface predominantly granulate, except of transversal furrow. Each granule bearing scale-like seta.

Pronotum transverse, with disc transversely convex; sides broadly explanate in about apical three-fifths; widest behind middle, thence at first subparallel then arcuate towards anterior angles, deeply emarginate towards posterior angles, so that the explanation is narrow basally. Lateral border of strongly explanate part basally blunt. Base wider than apex, slightly notched in the middle, nearly straight towards, but emarginate before posterior angles. Apex in the middle with transverse bulge. Anterior angles subrectangular, protruding beyond apical border. Posterior angles acute, tooth-like. Convex disc latero-basally with deep, round impression. Surface covered with setigerous granules as on head.

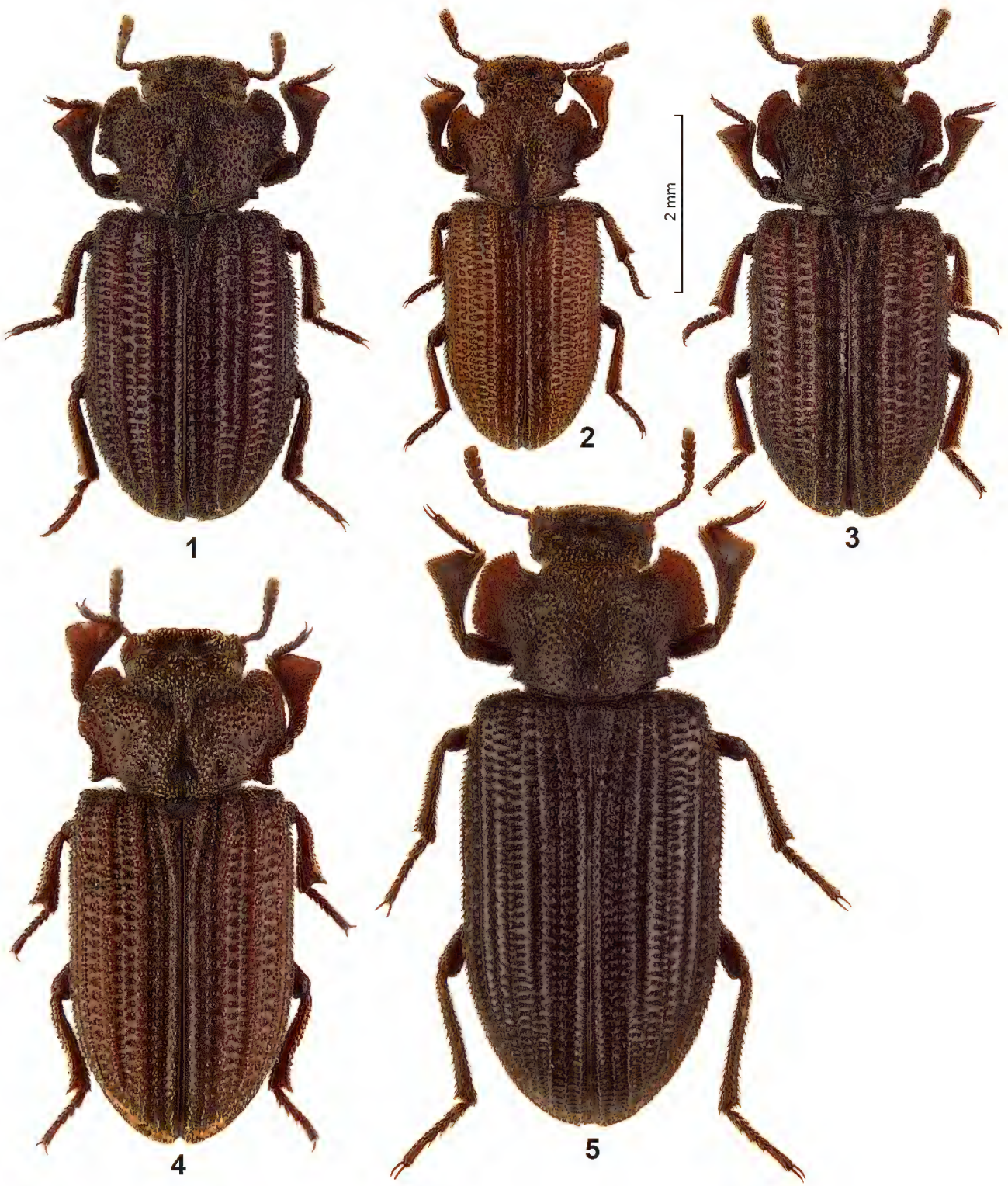
Elytra elongate, subparallel-sided for about two-thirds of their length, then broadly arcuate towards apices. Intervals predominantly with one row of small setigerous granules, only basally thickened parts of elevated intervals partly with two rows. 3rd, 5th, and 7th intervals elevated and somewhat thickened at base; intermediate intervals less prominent. Seriate setigerous punctures large and deep; between 7th interval and lateral border with 3 rows of punctures.

Legs: Tarsi laterally compressed.

Aedeagus see Fig. 7.

Differential diagnosis

Sclerum impressicolle n. sp., *S. impressifrons* n. sp., and *S. sinuatocolle* are similar in body size and shape. In *S. impressifrons* n. sp. and *S. sinuatocolle* n. sp., how-



Figs. 1–5. *Sclerum* spp., dorsal view. – **1**. *S. sinuatocolle* n. sp., ♂ holotype (NHMB). **2**. *S. impressifrons* n. sp., ♂ holotype (CRG). **3**. *S. impressicolle* n. sp., ♂ holotype (CRG). **4**. *S. ferrugineum* (Fabricius), non-type (CRG). **5**. *S. laoticum* n. sp., ♂ holotype (SMNS).

Figs. 6–10. *Sclerum* spp., aedeagi, dorsal (left) and lateral (right) views. – **6**. *S. ferrugineum* (Fabricius), non-type (CRG). **7**. *S. impressicolle* n. sp., paratype (CRG). **8**. *S. impressifrons* n. sp., holotype (CRG). **9**. *S. laoticum* n. sp., holotype (SMNS). **10**. *S. sinuatocolle* n. sp., holotype (NHMB).

ever, the posterior corner of the broadly explanate part of the pronotum is not blunt, but is forming an angulation (*S. impressifrons* n. sp.) or is tooth-like (*S. sinuatocolle* n. sp.). The three species can also be recognized by the distinctly different shape of the aedeagus (compare Figs. 7, 8, 10).

Sclerum impressifrons **n. sp.**
(Figs. 2, 8)

Holotype ♂: Thailand, Mae Hong Son Prov., Soppong (Pangmapa), 4.V.2004, R. GRIMM leg. (CRG).

Paratypes: Same data as holotype, 3 ex. (CRG). – Thailand, Mae Hong Son, 26.–27.IV. 2003, R. GRIMM leg., 1 ♂ (SMNS).

Etymology

Impressus (Lat.) = impressed combined with frons (Lat.) = forehead, front.

Description

Oblong, subparallel-sided, ferruginous, whole surface rather densely micro-granulate, matt to faintly shining. Body length 4.5–4.7 mm, body width 1.9–2.1 mm.

Head widest at basal part of genae and here wider than at eye level; anterior border of clypeus arcuate from gently notched clypeo-genal meeting to U-shaped emargination in the middle; between clypeus and frons with transversal elevation, behind this broadly, transversely furrowed; at the inner border of eyes with high elevation; in the middle between the eye elevations with elevation composed of high tubercles. Surface predominantly granulate, except of transversal furrow. Each granule bearing scale-like seta.

Pronotum transverse, with disc transversely convex; sides broadly explanate in about apical three-fifths; widest behind middle, thence at first shallowly emarginate then arcuate towards anterior angles, deeply emarginate towards posterior angles, so that the explanation is narrow basally. Lateral border of strongly explanate part basally forming a blunt tooth. Base about as wide as apex, bisinuate. Apex in the middle with transverse elevation. Anterior angles acute, protruding beyond apical border. Posterior angles acute, tooth-like. Convex disc latero-basally with impression. Surface covered with setigerous granules as on head.

Elytra elongate, subparallel-sided for about two-thirds of their length, then broadly arcuate towards apices. Intervals predominantly with one row of small setigerous granules, only 2nd interval on basally thickened part and on apical declivity partly with two irregular rows. Intervals nearly equal, only 2nd interval slightly more elevated, especially basally. Seriate setigerous punctures large and deep; between 7th interval and lateral border with 3 rows of punctures.

Legs: Tarsi laterally compressed.

Aedeagus see Fig. 8.

Differential diagnosis

Sclerum impressifrons n. sp. shares with *S. sinuatocolle* n. sp. the distinct posterior corner basally of the broadly explanate part of the pronotum which is tooth-like in *S. sinuatocolle* n. sp., but only angulate in *S. impressifrons* n. sp. In *S. sinuatocolle* n. sp. the body is wider on average (body width 2.1–2.7 mm) than in *S. impressifrons* n. sp. (body width 1.9–2.1 mm). Both species differ distinctly in the shape of the aedeagus (Figs. 8, 10).

Sclerum sinuatocolle **n. sp.**
(Figs. 1, 10)

Holotype ♂: Thailand, Umphang, 500 m, 16°04′N 98°53′E, 26.IV.–6.V.1991, D. Král leg. (NHMB).

Paratypes: Same data as holotype, 5 ex. (NHMB), 1 ex. (CRG). – Thailand, Lansang Nat. Park, 500 m, 16°48′N 98°57′E, 18.–24.IV.1991, D. Král leg., 3 ex. (NHMB). – Nepal, Sauraha, Chitwan Nat. Park, 20.–25.V.1992, I. Jeniš leg., 1 ex. (CRG). – Same data, but J. Moravec leg., 1 ex. (NHMB). – C Laos, Boli Kham Xai Prov., 8 km NE Ban Nape, 600 m, 18°21′N 105°08′E, 1.–18.V.2001, L. Dembický leg., 3 ex. (SMNS). – Laos, Vientiane Prov., 55 km NE Vientiane, Lao Pako env., 200 m, 1.–4.V.2004, J. Bezděk leg., 1 ex. (SMNS). – Laos, Oudom Xay Prov., Muang Pak Ben env., 4.–8.V.2003, O. Šafránek leg., 1 ex. (SMNS). – NE Laos, Vientiane, Suka, 1.II.1986, Kabakov leg., 1 ex. (HNHM). – Myanmar, Shwegu (labelled as Birmania, Schwegoo Myo), no date and collector stated, 1 ex. (SMNS). – Myanmar (labelled as Birma), Inya Lake, 30.VIII.1978, X. Bellés leg., 3 ex. (HNHM). – [India], I. Andaman, 1877, Deyrolle leg., 2 ex. (HNHM).

Etymology

Sinuatus (Lat.) = sinuate, combined with collum (Lat.) = neck (refers in this case to the pronotum).

Description

Oblong, subparallel-sided, ferruginous to piceous, whole surface rather densely micro-granulate, matt to faintly shining. Body length 4.9–5.8 mm, body width 2.1–2.7 mm.

Head widest at basal part of genae and here slightly wider than at eye level; anterior border of clypeus arcuate from clypeo-genal meeting to V-shaped emargination in the middle; between clypeus and frons with transversal elevation, behind this broadly, transversely furrowed; at inner border of eyes with high elevation; in the middle between the eye elevations with elevation composed of high tubercles. Surface predominantly granulate, except of transversal furrow. Each granule bearing scale-like seta.

Pronotum transverse, with disc transversely convex; sides broadly explanate in about apical three-fifths; widest behind middle, thence at first shallowly emarginate then arcuate towards anterior angles, deeply emarginate towards posterior angles, so that the explanation is narrow basally. Lateral border of strongly explanate part basally tooth-like or at least angulate. Base somewhat wider than apex, bisinuate. Apex in the middle with transverse bulge. Anterior angles subrectangular, protruding beyond apical border. Posterior angles acute, tooth-like. Convex disc latero-basally with impression. Surface covered with setigerous granules as on head.

Elytra elongate, subparallel-sided for about two-thirds of their length, then broadly arcuate towards apices. Intervals predominantly with one row of small setigerous granules, only basally thickened parts of elevated intervals partly with two rows. 3rd, 5th, and 7th intervals elevated and slightly thickened at base; intermediate intervals less prominent. Seriate setigerous punctures large and deep; between 7th interval and lateral border with 3 rows of punctures.

Legs: Tarsi laterally compressed.

Aedeagus see Fig. 10.

Differential diagnosis

See under *Sclerum impressifrons* n. sp.

Sclerum laoticum **n. sp.**
(Figs. 5, 9)

Holotype ♂: Laos, S Udomxai Prov., Pak Beng, 450 m, 19°53′37″N 101°07′50″E, 18.–27.V.2001, J. Kolibáč leg. (SMNS).

Paratypes: Same data as holotype, 1 ♀ (SMNS), 1 ♂ (CRG). – Laos, Lao Muang env., V.2004, O. Šafránek leg., 2 ♂♂ (SMNS).

Etymology

The species name refers to Laos where the type series was collected.

Description

Oblong, subparallel-sided, blackish brown to black, whole surface rather densely micro-granulate, faintly shining. Body length 7.2–8.0 mm, body width 3.0–3.4 mm.

Head widest between genae and here only slightly wider than at eye level; anterior border of clypeus arcuate from gently notched clypeo-genal meeting to V-shaped emargination in the middle; between clypeus and frons with transversal elevation, behind this broadly, transversely furrowed; at inner border of eyes with high elevation. Clypeus, transversal elevation, apical slope of genae, elevations at inner border of eyes, frons in the middle and latero-apically granulate. Each granule bearing scale-like seta.

Pronotum transverse, with disc transversely convex; sides explanate in about apical three-quarters; widest behind middle, thence at first subparallel then arcuate towards anterior angles, abruptly and deeply emarginate towards posterior angles. Lateral border of explanate part basally rounded. Base as wide as apex, shallowly bisinuate, in the middle protruding posteriorly and arcuate, only slightly emarginate before posterior angles. Apex feebly bisinuate, in the middle with transverse bulge. Anterior angles acute, protruding beyond apical border. Posterior angles acute, toothlike. Surface covered with setigerous granules as on head.

Elytra elongate, subparallel-sided for somewhat more than half of their length, then broadly arcuate towards apices; with rows of setigerous punctures, and slightly convex intervals with single rows of small setigerous granules. Punctural rows somewhat broader than intervals. 3rd, 5th, and 7th intervals only slightly more raised than remaining

intervals; between 7th interval and lateral border with 3 rows of punctures.

Legs: Tarsi cylindrical.

Aedeagus see Fig. 9.

Differential diagnosis

In *Sclerum laoticum* n. sp. the lateral border of the pronotum behind the middle is deeply emarginate as in *S. impressicolle* n. sp., *S. impressifrons* n. sp., and *S. sinuatocolle* n. sp., but it is distinguished by the larger body size, the cylindrical tarsi which are not depressed laterally, and the shape of the aedeagus (Fig. 9).

3 Key to species of *Sclerum* described and discussed in this paper

1 Lateral border of pronotum behind the middle only weakly emarginate; body shape see Fig. 4, aedeagus see Fig. 6. ..... ***ferrugineum***

– Lateral border of pronotum behind the middle strongly emarginate. **2**

2 Larger, body length over 7 mm; tarsi cylindrical; body shape see Fig. 5, aedeagus see Fig. 9. ..... ***laoticum* n. sp.**

– Smaller species, body length under 6 mm; tarsi laterally compressed. **3**

3 Outer corner of pronotum at base of broadly explanate part blunt, body shape see Fig. 3, aedeagus see Fig. 7. ..... ***impressicolle* n. sp.**

– Outer corner of pronotum at base of broadly explanate part at least somewhat angulate or tooth-like. **4**

4 Outer corner of pronotum at base of broadly explanate part tooth-like; body wider on average (body width 2.1–2.7 mm); body shape see Fig. 1, aedeagus see Fig. 10. ..... ***sinuatocolle* n. sp.**

– Outer corner of pronotum at base of broadly explanate part forming an angulation; body narrower on average (body width 1.9–2.1 mm); body shape see Fig. 2, aedeagus see Fig. 8. ..... ***impressifons* n. sp.**

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New and little known species of Tenebrionidae (Coleoptera) from Borneo (5)

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Abstract

The following new genera and new species from Malaysia/Borneo are described: *Borneosphaerotus* **n. gen.**, *Borneosynopticus* **n. gen.**, *Alphitobius inopinatus* **n. sp.**, *Borneosphaerotus santubongicus* **n. sp.**, *Borneosynopticus tubericollis* **n. sp.**, *Bradymerus ater* **n. sp.**, *Cryptobatoides merkli* **n. sp.**, *Derosphaerus laticollis* **n. sp.**, *Microatasthalus fungicolus* **n. sp.**, *Platydema kubahensis* **n. sp.**, and *Spiloscapha borneensis* **n. sp.** New records from Borneo are given for *Boletoxenus mixtus* Grimm, 2014, *Cryptobatoides gebieni* Kaszab, 1941, *Cryptobatoides opaca* Kaszab, 1941, *Derosphaerus chewi* Grimm, 2014, and *Microatasthalus hadrocerus* Ando, 2010.

Keywords: Tenebrionidae, Borneo, Malaysia, Indonesia, Kalimantan, Sabah, Sarawak, Boletophagini, Cnodalonini, Diaperini, Ulomini, new genera, new species, new records.

Zusammenfassung

Folgende neue Gattungen und Arten werden beschrieben: *Borneosphaerotus* **n. gen.**, *Borneosynopticus* **n. gen.**, *Alphitobius inopinatus* **n. sp.**, *Borneosphaerotus santubongicus* **n. sp.**, *Borneosynopticus tubericollis* **n. sp.**, *Bradymerus ater* **n. sp.**, *Cryptobatoides merkli* **n. sp.**, *Derosphaerus laticollis* **n. sp.**, *Microatasthalus fungicolus* **n. sp.**, *Platydema kubahensis* **n. sp.** und *Spiloscapha borneensis* **n. sp.** Neue Funde von *Boletoxenus mixtus* Grimm, 2014, *Cryptobatoides gebieni* Kaszab, 1941, *Cryptobatoides opaca* Kaszab, 1941, *Derosphaerus chewi* Grimm, 2014 und *Microatasthalus hadrocerus* Ando, 2010 werden mitgeteilt.

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1 Introduction

In the present fifth part of the series concerning new and little known species of Tenebrionidae from Borneo, two new genera and nine new species are described. New faunistic data of several other species and in some cases taxonomic notes are added.

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Acronyms of depositories

CKA	Collection Dr. Kiyoshi Ando, Osaka, Japan
CRG	Collection Dr. Roland Grimm, Neuenbürg, Germany
CSA	California State Collection of Arthropods, Sacramento, U. S. A. (Dr. Andrew Cline)
HNHM	Hungarian Natural Museum, Budapest, Hungary (Dr. Ottó Merkl)
MHNG	Muséum d'Histoire Naturelle, Genève, Switzerland (Dr. Giulio Cuccodoro, Dr. Ivan Löbl)
MNHN	Muséum National d'Histoire Naturelle, Paris, France (Dr. Antoine Mantilleri)
NMP	National Museum, Department Entomology, Prague, Czech Republic (Dr. Jiří Hájek)
SMNS	Staatliches Museum für Naturkunde, Stuttgart, Germany (Dr. Wolfgang Schawaller)
ZSM	Zoologische Staatssammlung Munich, Germany (Dr. Michael Balke)

2 The species

2.1 Tenebrioninae Latreille, 1802

Bolitophagini Kirby, 1837

Boletoxenus mixtus Grimm, 2014

Material examined

Borneo, Malaysia, Sabah, Crocker Range Park, Mahua Waterfall area, 1000–1200 m, 23.–24.II.2014, R. Grimm leg., 1 ♂, 2 ♀♀ (CRG).

Remarks

This species was described based on males (Grimm 2014). The females are of the same body shape, but the spatulate epistomal horn is lacking, the pronotal horns are reduced to two tubercles, and the elevation of the 1st abdominal ventrite (cf. Grimm 2014) is only faintly developed. The above mentioned male is smaller than the type specimens, the spatulate epistomal horn is shorter, and the pronotal horns are short, the straight vestiges are directed forward, with an apical fringe of yellowish hairs. According to the newly accessed specimens the body length is 6.9–9.0 mm and the body width 3.5–4.8 mm.

Microatasthalus fungicolus **n. sp.**
(Figs. 5, 5a)

Holotype ♂: Borneo, Malaysia, Sarawak, Bako Nat. Park, 6.–7.XII.2010, R. Grimm leg. (CRG).

Paratypes: Same data as holotype, 3 ♂♂, 4 ♀♀ (CRG), 1 ♀ (SMNS). – Borneo, Sabah, Mt. Kinabalu Nat. Park, Poring Hot Springs area, below Langanan Fall, 800 m, 11.V.1987, A. Smetana leg., 3 ♂♂, 1 ♀ (MHNG). – Borneo, Sabah, Mt. Kinabalu Nat. Park, Poring Hot Springs area, Langanan creek, 915 m, 18.VIII.1988, A. Smetana leg., 2 ♂♂, 5 ♀♀ (MHNG), 2 ♂♂, 2 ♀♀ (SMNS).

Etymology

Fungicolus (Lat.) = living (dwelling) in fungi, in this case bracket fungi.

Description

Oblong, subparallel-sided, transversely convex; black, antenna, palpi and legs paler fulvous; shining. Body length 3.3–4.0 mm, body width 1.7–2.0 mm.

Head coarsely and densely punctured with supraorbital ridge; clypeus with anterior border slightly arcuate, in the middle with short trapezoidal to rectangular, transverse, at front densely hirsute horn (pubescence sometimes more or less abraded); fronto-clypeal suture ill-defined. Genae before eyes sinuate, eyes completely divided by genal canthus; genal canthus only slightly projecting beyond outer margin of eye. Antennae 11-segmented, the 5 terminal antennomeres forming a moderate club; 11th antennomere with apex rounded, embedded into the truncate apex of 10th.

Pronotum transverse, width/length ratio 1.46–1.87, transversely convex, narrowest at base, widest before the middle; in males area behind anterior border armed with a pair of nearly horizontal, long, slender, and incurved horns with a minute tooth at apex; in females horns replaced by small longitudinal elevations. Anterior borders in males slightly bisinuate, in females straight in the middle; lateral borders dentate with 6–7 teeth, slightly arcuate. Surface covered with coarse punctures and scattered small setigerous tubercles; in males depressed between horns. Anterior angles somewhat produced by a tooth, posterior angles obtuse. Scutellum small, subpentagonal. Propleura coarsely punctured, between punctures shagreened; prosternal apex bent down posteriorly.

Elytra subparallel-sided, slightly divergent posteriorly, with rows of coarse, deep punctures; intervals with rows of setigerous tubercles; lateral borders dentate, in dorsal view only invisible before apex. Ventral surface of meso- and metaventrite as in propleura; metaventrite in the middle of anterior border with a cone-like process, strongly depressed in the middle. Abdominal ventrites coarsely, densely punctured.

Legs without modifications.

Aedeagus see Fig. 5a.

Differential diagnosis

Microatasthalus fungicolus n. sp. is similar in size and body shape to *M. hadrocerus* Ando, 2010, but in males of *M. hadrocerus* the clypeal horn is long, subcylindrical, and without pubescence at front; the apicale of the aedeagus is distinctly rounded at its apex and not slightly truncate as in *M. fungicolus* n. sp. (compare Fig. 5a with Ando 2010: fig. 3). The colour of *M. hadrocerus* is reddish brown to castaneous, the genal canthus is distinctly projecting beyond outer margin of the eye, the tubercles on the pronotum are less dense, and the tubercles of the elytral intervals, especially on the disc of the elytra, are somewhat smaller and less dense.

Microatasthalus hadrocerus Ando, 2010

Material examined

Borneo, Malaysia, Sabah, Mt. Kinabalu Nat. Park, Poring Hot Springs, 525 m, 18.–21.II.2014, R. Grimm leg., 16 ex. (CRG).

Distribution

Malaysia/Sarawak (Ando 2010, Grimm 2014), Malaysia/Sabah (new record).

Alphitobiini Reitter, 1917

Alphitobius inopinatus **n. sp.**
(Figs. 1, 1a)

Holotype ♂: [Borneo], Indonesia, E Kalimantan, 55 km W of Balikpapan, PT Fajar Surya Swadaya, 01°18.3′S 116°21.0′E, 100 m, J. Hájek, J. Schneider & P. Votruba leg., 24.–25. & 29.XI.2011 (NMP).

Etymology

Inopinatus (Lat.) = unexpected.

Description

Oval, black, with clypeus, labrum, palpi, antennae, scutellum and legs paler reddish-brown; moderately shining. Body length 6.5 mm, body width 3.0 mm.

Head subtrapezoidal, above densely, on clypeus and genae somewhat finer punctured than on remaining parts; anterior border of clypeus distinctly emarginate in the middle, laterally broadly arcuate towards front; outline continuous, not interrupted between clypeus and frons; fronto-clypeal suture distinct. Eyes large, constricted by genal canthus, dorsal part smaller than ventral part. Genae in front of eyes with impression, about as wide as eyes, hardly projecting beyond contour of eyes. Antennae thickened, antennomeres 4 to 10 distinctly serrate. Submentum conversely trapezoidal.

Pronotum transversely convex, width/length ratio 2.1 (measured transversally at base, longitudinally along midline); subtrapezoidal, widest at base, converging apically in nearly straight line; apical and basal borders bisinuate; lateral borders and apical border laterally distinctly margined; basal border finely margined laterally, margination of basal and apical border broadly interrupted in the middle; anterior and posterior angles acute; densely punctured, interspaces mostly broader than punctures. Propleura with interrupted longitudinal wrinkles. Prosternal apophysis horizontally projecting beyond procoxae, subacute and apically emarginate.

Elytra obovate, base slightly wider than base of pronotum; with 9 striae and additional scutellary striole. Punctures of rows coarse and dense. Intervals slightly, apically distinctly convex, much wider than striae; with fine, scattered, setigerous punctures. Lateral borders in dorsal view nearly visible on whole length, only concealed at level of 1st abdominal ventrite; apically broadly salient. Scutellum sub-pentagonal. Base of mesosternum deeply excavate. Metasternum and abdominal ventrites finely punctured.

Legs: Protibiae strongly, meso- and metatibiae moderately dilated towards apex.

Aedeagus see Fig. 1a.

Differential diagnosis

In the pronotal and elytral structure, and in the shape of the protibiae *Alphitobius inopinatus* n. sp. resembles the cosmopolitan *A. diaperinus* (Panzer, 1796). In this species the lateral borders of the pronotum are converging not in a straight line towards the apex, but are subparallel basally (compare Fig. 1 with Schawaller & Grimm 2014: fig. 15), the antennae are less serrate and only the 5th to 10th antennomeres are serrate, and the anterior border of the clypeus is only shallowly emarginate in the middle.

Remarks

Except of the cosmopolitan species *Alphitobius diaperinus* (Panzer, 1796) and *A. laevigatus* (Fabricius, 1781), up to now all congeners are restricted to the African region, the reason why Grimm (2008) and Schawaller & Grimm (2014) assumed that the genus *Alphitobius* is a native Ethiopian faunal element. Therefore the discovery of a representative new for science in Borneo is quite surprising.

2.2 Diaperinae Latreille, 1802

Diaperini Latreille, 1802

Platydema kubahensis **n. sp.**

(Figs. 2, 2a, 2b, 2c)

Holotype ♂: Borneo, Malaysia, Sarawak, Kubah Nat. Park, Matang Wildlife Centre, 50 m, 11.–12.XII.2010, R. Grimm leg. (CRG).

Paratype: Borneo, Malaysia, Sarawak, Kubah Nat. Park, Matang Wildlife Centre, 19.–22.IX.2008, R. Grimm leg., 1 ♀ (CRG).

Etymology

The species name refers to the Kubah National Park where the type specimens were collected.

Description

Oval, dorsal side glabrous, shining, unicoloured castaneous, legs somewhat paler. Body length 5.6–6.0 mm, body width 2.8–3.0 mm,

Head with fine punctation, forehead in front of eyes subtrapezoidal; in males frons with two short, closely set, dentiform horns of same length, without setation, and with shallow excavation behind horns; in females horns reduced to low swellings; in both males and females clypeus with anteromedial tubercle. Length/width ratio of antennomeres 1–11 as 2:1 / 3:4 / 7:5 / 6:7 / 3:4 / 2.5:4 / 2.5:4 / 2.5:4 / 2.5:4 / 2.5:4 / 5:4.

Pronotum transverse, transversely convex, with shallow basal foveae; punctation similar, but less dense as on head. Basal border bisinuate, not margined; apical border finely margined, feebly emarginate, nearly straight in the middle two fourths, with anterior corners somewhat protruding. Anterior angles obtusely rounded, posterior angles obtuse. Propleura densely set with setigerous punctures, intermediate spaces shagreened.

Elytra oval, convex, about 1.3 times as long as wide; besides scutellar row and lateral margin with 8 rows of punctures in feeble striae, third row with approximately 70 punctures. Intervals flat with similar punctation as on pronotum. Abdominal ventrites with setigerous punctures, abdominal ventrites 1–3 laterally rugulose.

Legs without modifications.

Aedeagus see Fig. 2c.

Differential diagnosis

Platydema kubahensis n. sp. is characterized by the subtrapezoidal forehead, the short, dentiform horns of the males, the anteromedial clypeal tubercle in both sexes, and the shape of the aedeagus and is thus distinguished from all other known Oriental, Moluccan, and New Guinean species of this genus (compare Grimm 2010; Schawaller 2004, 2008, 2012).

Scaphidemini Reitter, 1922

Spiloscapha borneensis **n. sp.**
(Figs. 6, 6a)

Holotype ♂: Borneo, Malaysia, Sabah, Mt. Kinabalu Nat. Park, Poring Hot Springs area, 525 m, 18.–21.II.2014, R. Grimm leg. (CRG).

Paratypes: Same data as holotype, 11 ex. (CRG), 5 ex. (SMNS).

Etymology

The species name refers to the island of Borneo where the type series was collected.

Description

Oblong-oval, rufous to castaneous, shining. Scape, pedicel and 3rd antennomere castaneous, flagellum from apex of 3rd antennomere black. Body length 3.0–3.7 mm, body width 1.5–1.8 mm,

Head with punctation denser and somewhat coarser than on pronotum. Clypeus truncate at apex, frontoclypeal suture weak. Genae long and oblique, moderately convex. Eyes without inner ocular sulcus, strongly divided by genal canthus.

Pronotum transverse, trapezoidal, widest at base, punctation somewhat sparser and finer than on head, punctures setigerous in part; anterior margin, slightly emarginate, straight in median two fourths to roundly and slightly produced in median third, margined in lateral third; lateral borders weakly arcuately narrowing from base to apex, broadly sulcate; basal border slightly bisinuate and unmargined; anterior angles obtusely rounded, hardly produced; posterior angles rectangular. Propleura finely sulcate and microgranulated.

Elytra moderately convex, between ill-defined scutellar row and lateral margin with 8 rows of punctures, 8th row obsolete, 3rd row with about 40 densely set punctures. Intervals flat, with widely spaced, minute punctures and scattered setigerous punctures of the same size or sometimes somewhat larger than punctures in primary rows. Lateral borders visible in almost their entire length, not discernible only before apex. Metaventrite and abdominal ventrites nearly smooth, with only sparse and minute setigerous punctures; metaventrite with distinctly larger punctures laterally than medially.

Aedeagus see Fig. 6a.

Differential diagnosis

Spiloscapha borneensis n. sp. is similar to *S. medvedevi* Grimm, 2010. However, in *S. medvedevi* the dorsal side is not uniformly coloured, but parts of pronotum and elytra are with irregular blackish pattern, the elytra often with an irregular transverse patch near the middle and an irregular patch near the apex (compare Fig. 6 with Grimm 2010: fig. 7); moreover the distal part of the last antennomere is ferruginous. *S. medvedevi* is distinctly more convex and both species differ in the shape of the aedeagus (compare Fig. 6a with Grimm 2010: fig. 29).

2.3 Stenochiinae Kirby, 1837

Cnodalonini Gistel, 1856

Borneosphaerotus **n. gen.**

Etymology

Borneo and σ□αίροειδ□ς (Gr.) = spherical.

Description

Small (body length below 4 mm), apterous. Forehead shortened; head with ocular sulcus; between labrum and clypeus with distinct membrane. Antennae apically thickened. Pronotum not margined. Elytra short, strongly convex transversely and longitudinally; elytral rows coarsely punctured, intervals nearly smooth. Femora not clavate. Tibiae straight, cylindrical, without keels or furrows; in males pro- and mesotibiae apically with small, but distinct ventral tooth. Tarsi somewhat dilated, but not bilobed, with plantar surfaces bearing long, dense, fine setae; in males 1st metatarsomere ventrally with distinct tooth. Head, pronotum, and legs coarsely to rugosely punctured. Membrane between last three ventrites visible, last abdominal ventrite not margined.

Differential diagnosis

In Kaszab's (1941) key to the genera of Misolampini (now included in Cnodalonini) the new genus would run to *Microsphaerotus* Pic, 1928. *Microsphaerotus* is monotypical and the single specimen of *M. ruficornis* Pic, 1928, described by Pic (1928) from Annam (Vietnam), is destroyed by dermestids to a large extent; only the hind body and parts of the legs are left. According to Pic (l. c.) *Microsphaerotus* is much larger (body length 7 mm), and according to Pic (l. c.) and Kaszab (l. c.) the base of the pronotum is margined. In *Borneosphaerotus* n. gen. the forehead is shortened as in, e. g., *Eucyrtus* Pascoe, 1866, *Hemicera* Laporte de Castelnau & Brullè, 1831, or *Euhemicera* Ando, 1996. Neither Pic (l. c.) nor Kaszab (l. c.) refer to this character for *Microsphaerotus*.

Type species: *Borneosphaerotus santubongicus* n. sp.

Borneosphaerotus santubongicus **n. sp.**
(Figs. 7, 7a, 7b)

Holotype ♂: Borneo, Malaysia, Sarawak, Santubong Peninsula, Gunung Santubong, 300 m, 24.–26.II.2012, R. Grimm leg. (CRG).

Paratypes: Same data as holotype, but 6.IV.2009, 4 ♂♂, 1 ♀ (CRG), 1 ♂ (SMNS). – Same data, but 2.–5.XII.2010, 2 ♂♂ (CRG), 1 ♂ (SMNS).

Etymology

Named after Gunung Santubong where the type series was collected.

Description

Short, stout, strongly convex, shiny, castaneous to blackish; antennae, labrum, palpi, coxae, tibiae, tarsi, and sometimes sutural intervals paler reddish brown. Body length 3.1–3.8 mm, body width 1.7–2.2 mm.

Head widest near middle of eyes, eyes protruding beyond contours of head; shagreened, coarsely and densely punctured, with interspaces distinctly smaller than puncture diameters. Frons flat, clypeus slightly convex. Anterior border of clypeus straight, that of genae nearly straight, only slightly converging to lateral borders which are perpendicular to eyes. Clypeal sulcus distinct. Supraorbital sulcus deep and broad. Antennae apically thickened, shape of antennomeres see Fig. 7, length ratio of antennomeres 1–11 as 15 : 5 : 9 : 5½ : 5½ : 6 : 6½ : 7½ : 8 : 8 : 13½.

Pronotum transverse, subrectangular, width/length ratio 1.57–1.83, widest before middle; slightly convex longitudinally, strongly convex transversely, near anterior corners somewhat flattened; surface coarsely and densely punctured. Lateral borders finely explanate, somewhat more converging to anterior than to posterior border; apical border nearly straight, basal border shallowly arcuate. Anterior and posterior angles obtuse. Propleura coarsely punctured; prosternum bordered anteriorly, prosternal apophysis declivious behind coxae.

Elytra obovate in males, spherical in females, with lateral intervals bent downwards; with 9 rows of large punctures and an additional scutellar row, punctures larger than distances between them; intervals convex, mostly somewhat wider than punctural rows, nearly smooth, only with scattered microscopical, setigerous punctures. Metaventrite coarsely punctured, very short between meso- and metacoxae. Abdominal ventrites nearly smooth, with scattered microscopical, setigerous punctures, last ventrite apically shagreened. 1st abdominal ventrite with apex broadly arcuate and in basal part with conspicuous, deeply impressed, coarse punctures along lateral borders.

Legs narrow, femora not clavate, basally nearly smooth, but predominantly densely and coarsely punctured, punctures shagreened. Tibiae straight, cylindrical, without keels or furrows; in males pro- and mesotibiae apically with small, but distinct ventral tooth (Fig. 7). Tarsi somewhat dilated, with plantar surfaces bearing long, dense, fine setae; in males 1st metatarsomere ventrally with distinct tooth.

Aedeagus see Fig. 7b.

Borneosynopticus **n. gen.**

Etymology

Combination of Borneo and συνοπτικός (Gr.) = synoptic.

Description

Oblong, black, dorsal surface covered with broad, erect bristles. Frons impressed, clypeus curved up, clypeogenal meeting notched, genae raised. Eyes constricted by genal canthus, reniform. Antennae (Fig. 3) virtually 10-segmented, in some specimens with a fine suture visible between connate primary 10th and 11th antennomere. Ventral surface of genae in front of eyes with deep hole for taking scape, but without antennal groove between buccal process and eye. Maxillary palpi 4-segmented, with apical palpomere securiform. Pronotum subtrapezoidal, widely flattend laterally, disc with large, high bump. Elytral epipleura reaching apex. Legs long, robust; femora and tibiae covered with erect bristles. Pro- and mesotibiae dorsally widened towards the middle. Tarsal formula 5-5-4. Tarsi short; last pro- and mesotarsomere subequal in length to precedent tarsomeres combined, last metatarsomere slightly longer than precedent tarsomeres combined.

Differential diagnosis

On the first glance the new genus bears a certain resemblance to the monospecific genus *Macrosynopticus* Pic, 1922 (Amarygmini), because of the similar body shape with the subtrapezoidal pronotum having similar bulbs as in *Borneosynopticus* n. gen. But *Macrosynopticus* is distinguished by strongly keeled impair intervals, absent pubescence of the dorsal side, and different antennae not forming an apical club

Type species: *Borneosynopticus tubericollis* n. sp.

Borneosynopticus tubericollis **n. sp.**
(Figs. 3, 3a)

Holotype ♂: Borneo, Malaysia, Sabah, Crocker Range Park, Mahua Waterfall vic., 12.IV.2013, R. Grimm leg. (CRG).

Paratypes: Same data as holotype, 5 ex. (CRG). – Borneo, Malaysia, Sabah, Tawau Hills Park, 300 m, 4.–6.IV.2013, R. Grimm leg., 10 ex. (CRG), 3 ex. (SMNS), 2 ex. (CKA), 1 ex. (HNHM). – Borneo, Sabah W., Crocker Range W., W of Apin Apin, II.2000, M. Šnizek leg., 1 ex. (ZSM). – Borneo, Malaysia,

Sarawak, Gunung Gading Nat. Park, 100–250 m, 9.–12.III.2008, R. GRIMM leg., 3 ex. (CRG). – Borneo, Malaysia, Sarawak, Kubah Nat. Park near Headquarter, 100–300 m, 15.–18.IX.2008, R. GRIMM leg., 5 ex. (CRG), 2 ex. (SMNS).

Etymology

Tuber (Lat.) = hump, bump, protuberance; collum (Lat.) = neck, referring to the pronotum in this case.

Description

Oblong, black, mat to moderately shining; dorsal surface shagreened, covered with broad, erect bristles. Body length 6.1–8.0 mm, body width 2.9–3.7 mm.

Head with frontal impression, flat at bottom; clypeus straight, curved up, dorsally narrowly ridged; fronto-clypeal suture faint, straight; genae bulging, raised above level of eyes; facets of eyes large. Frons rugosely punctured, genae muricate to minutely granulate; punctures and granules bearing a broad, apically tapered, erect bristle, behind the bristle with a fine, long seta which is longer than the bristle and towering above the latter. Antennae with 3rd antennomere somewhat longer than 2nd, about as long as 4th and 5th combined; 5th to 7th quadrate, 8th subquadrate, 9th wider than long, 10th very large, longer than wide; 8th to 10th forming a loose club. Mentum reversed trapezoidal, carinate along midline.

Pronotum subtrapezoidal, widely flattened laterally; base and apex bisinuate. Disc centrally with large, high, frontally and laterally precipitous bump; apex of bump distinctly and broadly furrowed longitudinally, more weakly transversally, thus apex appearing bi- to quadrituberculate. Borders not margined, but basal border crenulate. Apical angles acute, basal angles subrectangular. Surface coarsely punctured with bristles and setae as on head, also along borders. Propleura microgranulated; prosternal apophysis terminating in a cone behind procoxal cavities.

Elytra convex transversally, widest at base, slightly converging towards apical two thirds, then shallowly rounded to apex. Disc in the middle at basal fourth flattened, laterally bordered by a longitudinal elevation. Surface coarsely, irregularly, laterally partly confluently punctured, with indicated rows on disc; punctures larger than distances between them, bearing bristles and setae as on head and pronotum. Basal borders crenulate, humeral angles dentate and humeral callosities distinct; lateral borders in dorsal view only visible in basal two thirds. Epipleura with scattered setigerous punctures. Scutellum with obsolete setigerous punctures. All ventrites with setigerous punctures.

Aedeagus see Fig. 3a.

Bradymerus ater **n. sp.**
(Fig. 4)

Holotype ♀: Borneo, Malaysia, Sabah, Keningau Crocker Range Park, 950 m, 21.III.2013, R. GRIMM leg. (CRG).

Paratype: Borneo, Malaysia, Sabah, Tenom, 19.–20.III.2013, R. GRIMM leg., 1 ♀ (CRG).

Etymology

Ater (Lat.) = black.

Description

Oblong, black, shining (Fig. 4). Body length 9.0–9.7 mm, body width 3.8–4.2 mm.

Head with coarse, dense punctation. Anterior border of clypeus slightly emarginate in the middle. Fronto-clypeal suture fine, but distinct. Genae smaller than eyes; frons with distinct supraorbital furrows, but without supraorbital keels. Last 5 antennomeres forming a moderate club.

Pronotum transverse, width/length ratio 1.5, strongly convex, widest in the middle; with coarse, dense, but separate punctation, interspaces between punctures ridged, before base punctures more separate. Anterior border slightly curved forward in the middle; lateral borders explanate, with feeble crenulation, arcuate and feebly emarginate before posterior corners; basal border bisinuate, explanate in the middle. Anterior corners acute, protruding; posterior corners subrectangular.

Elytra with punctural striae, punctures small, oblong, more than 30 in 3rd stria. Intervals minutely punctured; intervals 1, 2, 4, 6 with small tubercles, flat on disc, feebly convex on elytral declivity; interval 3 feebly convex on disc, with tubercles, keeled on elytral declivity; interval 5 similar to 4, but keeled in about apical half; interval 7 entirely keeled, keel on disc interrupted by tubercles; intervals 8, 9 convex with granules, 9 apically keeled.

Legs: Tibiae externally without keels; male tibiae unknown.

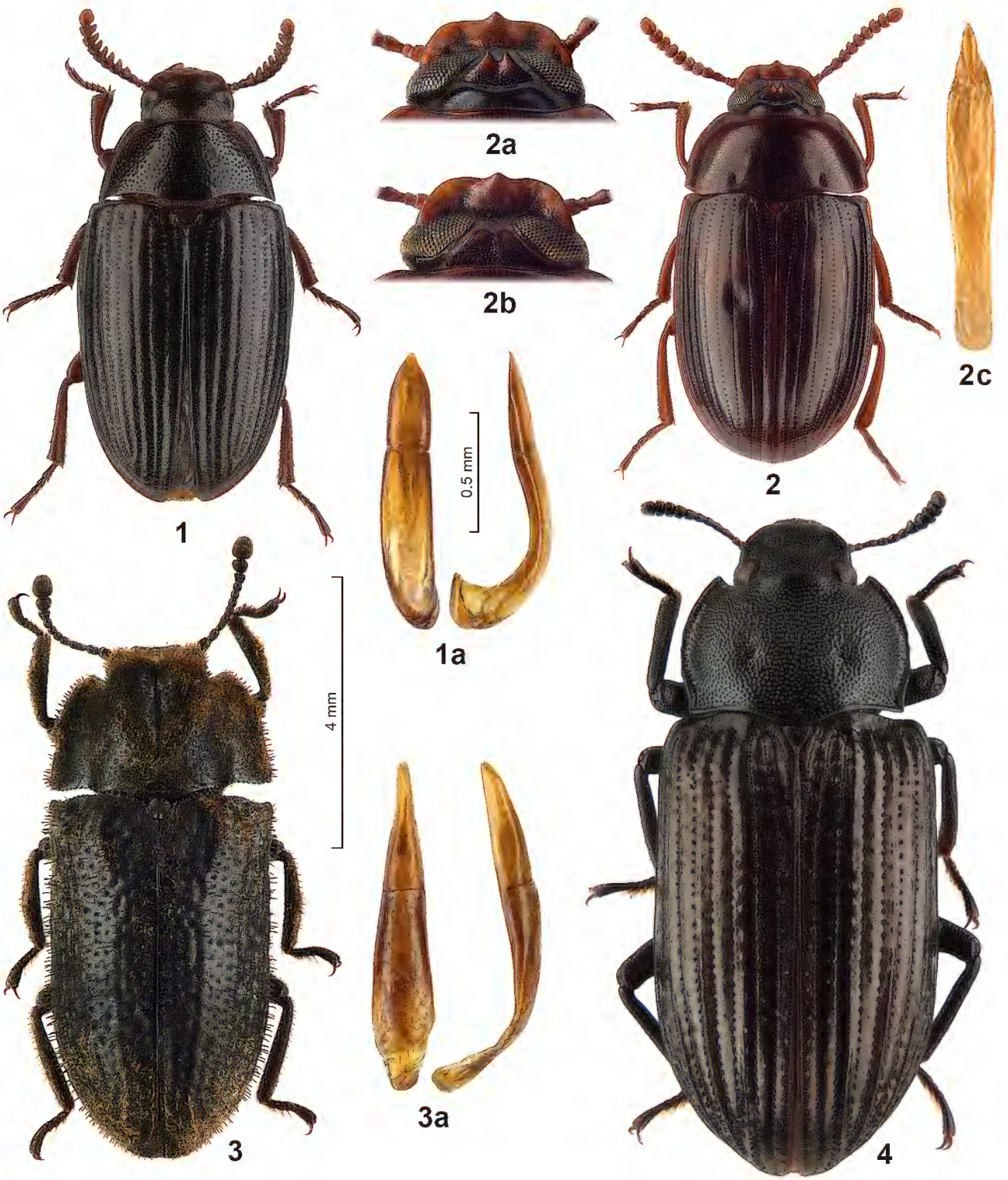
Differential diagnosis

Bradymerus ater n. sp. has a similar body shape as the Sulawesian *B. michihikoi* Schawaller, 2006, but the latter species differs in the extraordinarily wide supraorbital furrow, the pronotum with the anterior corners not protruding, the confluent punctation of the pronotum, and the differently keeled elytra without tubercles (compare SCHAWALLER 2006). The Taiwanese *B. masumotoi* Schawaller, 2006 is similarly keeled as *B. ater* n. sp., but the elytral intervals are without granules, the body is more elongate, and the pronotal disc is only feebly convex.

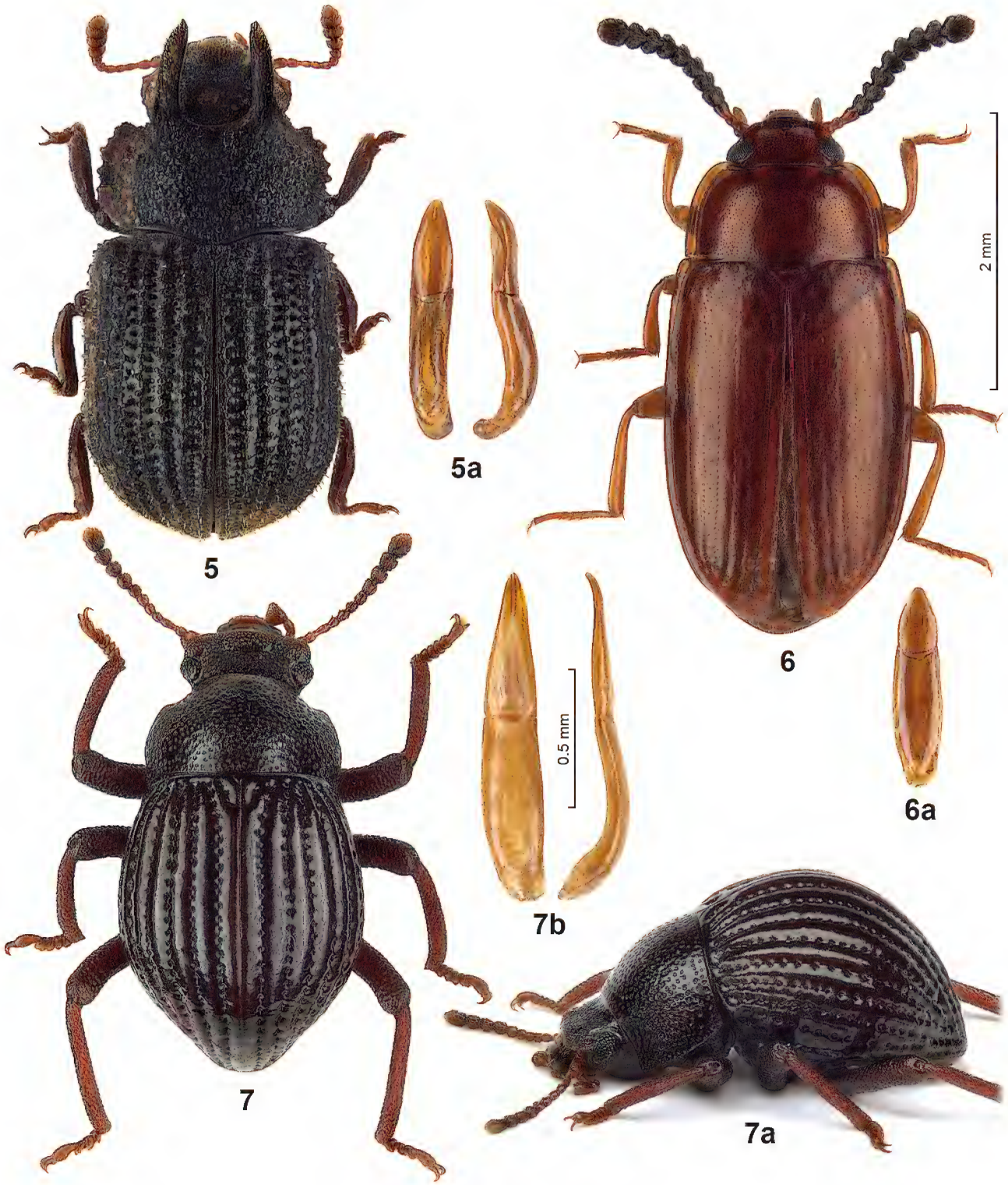
Cryptobatoides gebieni Kaszab, 1941

Material examined

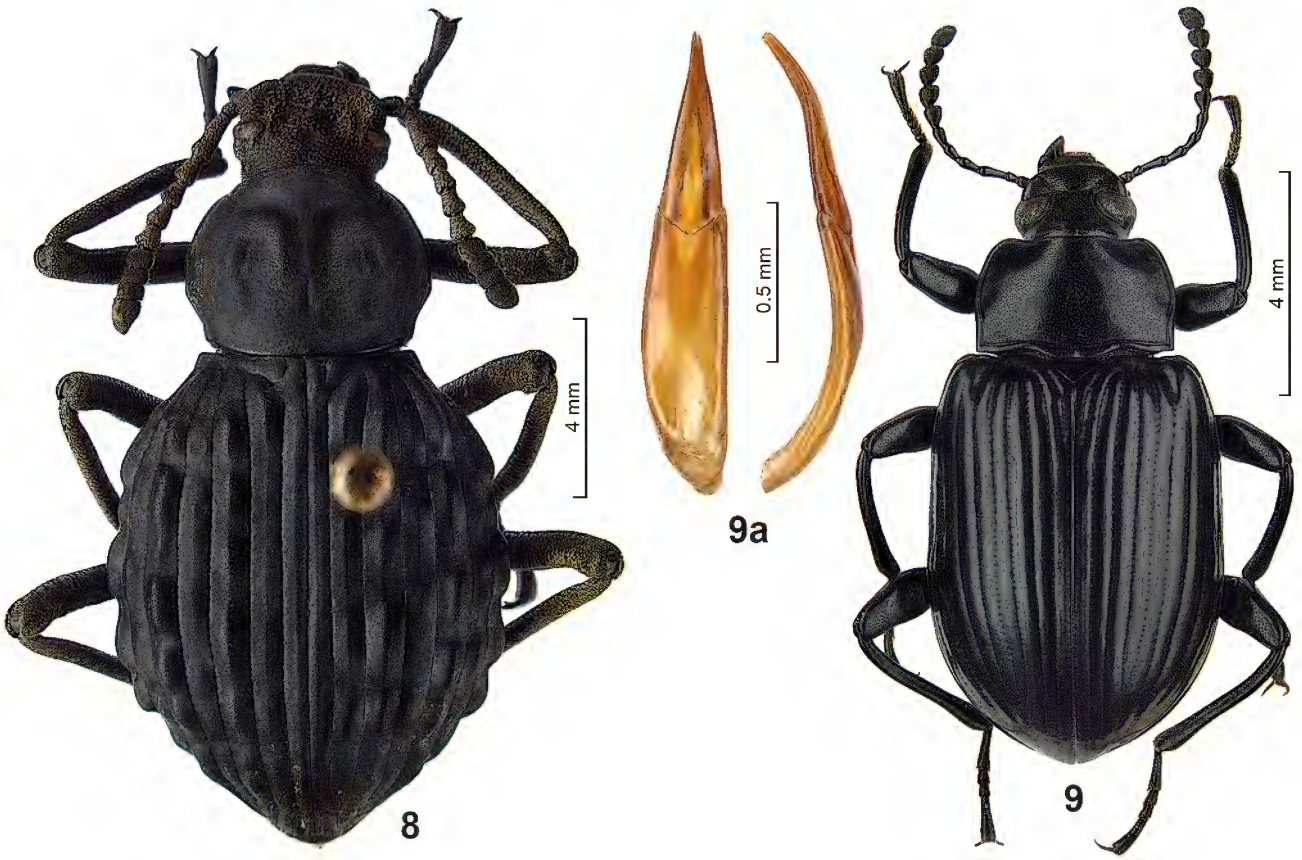
Borneo, Malaysia, Sabah, Danum Valley Conservation Area, Borneo Rainforest Lodge, 1.–4.III.2013, R. GRIMM leg., 1 ex. (CRG).



Figs. 1–4. Tenebrionidae spp., dorsal views (1, 2, 3, 4), dorsal views of head (2a ♂, 2b ♀), aedeagi, dorsal (1a and 3a left, 2c) and lateral (1a and 3a right) views. – **1**, **1a**. *Alphitobius inopinatus* n. sp. ♂ holotype. **2**, **2a**, **2b**, **2c**. *Platydema kubahensis* n. sp. ♂ holotype (2, 2a, 2c), ♀ paratype (2b). **3**, **3a**. *Borneosynopticus tubericollis* n. sp. ♂ holotype. **4**. *Bradymerus ater* n. sp. ♀ holotype.



Figs. 5–7. Tenebrionidae spp., dorsal views (5, 6, 7), oblique lateral view (7a), aedeagi, dorsal (5a and 7b left, 6a) and lateral (5a and 7b right) views. – **5**, **5a**. *Microatasthalus fungicolus* n. sp. ♂ holotype. **6**, **6a**. *Spiloscapha borneensis* n. sp. ♂ holotype. **7**, **7a**, **7b**. *Borneosphaerotus santubongicus* n. sp. ♂ holotype.



Figs. 8–9. Tenebrionidae spp., dorsal views (8, 9,), aedeagus, dorsal (9a left) and lateral (9a right) views. – **8**. *Cryptobatoides merkli* n. sp. ♀ holotype. **9**, **9a**. *Derosphaerus laticollis* n. sp. ♂ holotype.

Remarks

So far only the holotype from Sandakan (Sabah) was known (KASZAB 1941).

Distribution

E Malaysia/Sabah.

Cryptobatoides merkli **n. sp.**
(Fig. 8)

Holotype ♀: [Borneo], Indonesia, Kalimantan Barat, Belaban Ellat, Bukit Baka-Bukit Raya Nat. Park, lowland rainforest, 0°36′58″S 112°14′43″E, 300–400 m, 1.–4.I.2003, G. SZÖVÉNYI leg. (HNHM).

Etymology

Named in honour of Dr. OTTÓ MERKL, curator of Coleoptera in the Hungarian Natural History Museum in Budapest, who kindly provided me with the specimen for description.

Description

Unicoloured black, dull. Body length 17.5 mm, body width 9.0 mm.

Head with deep fronto-clypeal sulcus, weakly notched between clypeus and genae. Genae raised. Clypeus shallowly convex, with anterior border straight, rugosely punctured; medio-basally with short keel-like swelling which is continued by distinct keel on frons. Frons impreessed on both sides of this keel, and these impressions also keeled laterally at eyes; frons punctured as on clypeus. Vertex coarsely punctured. Antennae reaching base of pronotum.

Pronotum strongly convex transversally, somewhat wider than long, width/length ratio 1.24, widest near middle, apically more narrowed than basally. Anterior border nearly straight, finely margined laterally; lateral borders arcuate, weakly undulate in the middle, constricted before base, and finely margined; basal border arcuate, margined laterally. Anterior angles broadly rounded, posterior angles obtusely rounded. Surface with low longitudinal elevations, vaguely punctured and shagreened. Pro-

pleura vaguely longitudinally rugose. Prosternal apophysis declivous behind coxae, with wide and shallow furrow.

Elytra broadly oval, with lateral intervals bent downwards; at base as wide as pronotal base, widest in the middle. Striae finely punctured. Intervals convex, distinctly wider than striae; intervals 3, 5, 6 and 7 equipped with distinct elongate nodules, bearing minute, setigerous punctures; otherwise intervals shagreened with scattered microgranules. Combined base shallowly sinuate. Lateral margin in dorsal view only visible near base and apex. Last abdominal ventrite broadly margined.

Legs long, narrow; densely, but separately punctured. Tibiae straight, subcylindrical.

Differential diagnosis

So far only two further species of the genus *Cryptobatoides* Kaszab, 1941 were described. *C. opaca* Kaszab, 1914 is distinguished by flat elytral intervals. In *C. gebieni* Kaszab, 1941 the elytral intervals are also convex, but this species is more shining, the elytra are oblong oval, with the strial punctures larger, and the intervals evenly convex; the lateral borders of the pronotum are explanate in the middle, and the punctures of the legs are coarse and partly confluent.

Cryptobatoides opaca Kaszab, 1941

Material examined

Borneo, Malaysia, Sarawak, Gunung Gading Nat. Park, 100–250 m, 9.–12.III.2008, R. Grimm leg., 5 ex. (CRG). – Borneo, Malaysia, Sarawak, Kubah Nat. Park, Headquarter area, 160–300 m, 15.–17.II.2012, R. Grimm leg., 1 ex. (CRG).

Remarks

Until now only the holotype from Pontianak (Kalimantan) was known (Kaszab 1941).

Distribution

Indonesia/Kalimantan Barat (Kaszab 1941), E Malaysia/Sarawak (new record).

Derosphaerus chewi Grimm, 2014

Material examined

Borneo, Malaysia, Sabah, Mt. Kinabalu Nat. Park, Poring Hot Springs, 525 m, 18.–21.II.2014, R. Grimm leg., 1 ♀ (CRG).

Remarks

Until now only the male holotype was known (Grimm 2014).

Distribution

E Malaysia/Sabah (Grimm 2014).

Derosphaerus laticollis **n. sp.**

(Figs. 9, 9a)

Holotype ♂: Borneo, Malaysia, Sabah, Mt. Trus Madi, 1100 m, 1.–15.IV.2005, K. Martini leg. (CRG).

Paratypes: Borneo, [Malaysia], Sabah, Crocker Range W., route Keningau–Papar, V.1999, Z. Smrž leg., 1 ♂ (ZSM). – Borneo, Malaysia, Sabah, Crocker Range, Mt. Trus Madi, 1400 m, 05°33′00″N 116°31′00″E, 6.VII.2005, S. Chew leg., 1 ♀ (CSA).

Etymology

Latus (Lat.) = wide and collum (Lat.) = neck (referring in this case to the pronotum).

Description

Elongate oval, black, shining. Body length 10.3–11.7 mm, body width 5.0–6.0 mm.

Head with fine and uniform punctation; genae not widened, fronto-clypeal suture deep; eyes constricted by genal canthus, distance between eyes on frons narrower than anterior border of clypeus, the latter straight; frons without impressions or other modifications; supraocular groove deep; shape of antennomeres see Fig. 9, last antennomeres broader, but not forming a distinctly separated club, antennomeres 8 to 10 weakly dentate. Mentum reversed subtrapezoidal, with elevated, anteriorly narrowing middle-section, coarsely punctured, hirsute.

Pronotum transverse, subrectangular, slightly convex transversely; width/length ratio 1.67–1.70; widest somewhat behind middle. Lateral sides slightly rounded at widest point, nearly straight converging towards apex, weakly constricted behind widest point and then straight to base. Apex shallowly emarginate, base shallowly bisinuate. Lateral borders and apical border distinctly margined, apical margin interrupted in the middle; basal border with broad margin, especially in the middle. Apical angles broadly rounded, basal angles rectangular. Surface punctured as on head. Propleura minutely punctured, nearly smooth. Prosternum and prosternal apophysis hirsute, the latter with apex rounded.

Elytra elongate-oval, subparallel-sided, with 9 striae and additional scutellary striola; punctures of striae distinctly larger than those on pronotum, without setae; elytral intervals flat to weakly convex, with minute punctation. Epipleura complete, continuously narrowing to apex. Mesoventrite weakly excavate, basal half hirsute. Metaventrite with mid-longitudinal furrow, surface with fine, setigerous punctures. Abdominal ventrites finely punctured; membranes between last three ventrites exposed, last ventrite not bordered.

Legs long, with minutely punctured surface, femora clavate, anterior femora of males with elongate, pubescent ventral spot in the middle. Tibiae long and narrow, apically thickened, thickened part ventrally and latero-

basally with dense, short setation; tibial spurs short and inconspicuous. Anterior tarsomeres in males not dilated, tarsomere 5 of anterior tarsus longer than tarsomeres 1–4 combined; tarsomere 4 of posterior tarsus shorter than tarsomeres 1–3 combined; tarsomere 1 of posterior tarsus prolonged, longer than 2 and 3 combined.

Aedeagus see Fig. 9a.

Differential diagnosis

As in *Derosphaerus chewi* Grimm, 2014 and *D. reibnitzi* Grimm 2014, *D. laticollis* n. sp. is characterized by the elongate oval, black, and shining body, the broadly margined basal border of the pronotum, and the pubescent ventral spot of the male anterior femora, but the new species is easy to distinguish by the wide (width/length ratio 1.53 in *D. chewi* and 1.23–1.30 in *D. reibnitzi*) and differently shaped pronotum (compare Fig. 9 with Grimm 2014: figs. 12, 13). The three species can also be separated by the shape of the aedeagus (compare Fig. 9a with Grimm 2014: figs. 12a, 13a).

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Leaf beetles of the tribe Clytrini (Coleoptera: Chrysomelidae: Cryptocephalinae) from Borneo

Lev Medvedev & Pavel Romantsov

Abstract

A synopsis of the tribe Clytrini from Borneo is presented. Ten new species of Bornean Clytrini are described as new for science: *Pseudolopha borneoensis* **n. sp.**, *Aetheomorpha volkovi* **n. sp.**, *Ae. nigripennis* **n. sp.**, *Ae. flavoapicalis* **n. sp.**, *Ae. maculicollis* **n. sp.**, *Ae. similis* **n. sp.**, *Ae. collaris* **n. sp.**, *Ae. trusmadiensis* **n. sp.**, *Smaragdina nigricapitis* **n. sp.**, and *S. trifoveata* **n. sp.** *Aspidolopha nobilis* L. Medvedev, 1988 is transferred to the genus *Pseudolopha* L. Medvedev & Regalin, 1998 (**n. comb.**). *Clytra duodecimmaculata* (Fabricius, 1775) is recorded from Borneo for the first time. Generic and species keys to the Clytrini of Borneo are given.

K e y w o r d s : Chrysomelidae, Cryptocephalinae, Clytrini, Borneo, new species, keys.

Zusammenfassung

Es wird eine Übersicht über die Tribus Clytrini von Borneo gegeben. Zehn neue Arten von Borneo werden beschrieben: *Pseudolopha borneoensis* **n. sp.**, *Aetheomorpha volkovi* **n. sp.**, *Ae. nigripennis* **n. sp.**, *Ae. flavoapicalis* **n. sp.**, *Ae. maculicollis* **n. sp.**, *Ae. similis* **n. sp.**, *Ae. collaris* **n. sp.**, *Ae. trusmadiensis* **n. sp.**, *Smaragdina nigricapitis* **n. sp.** und *S. trifoveata* **n. sp.** *Aspidolopha nobilis* L. Medvedev, 1988 wird in die Gattung *Pseudolopha* L. Medvedev & Regalin, 1998 (**n. comb.**) gestellt. *Clytra duodecimmaculata* (Fabricius, 1775) wird zum ersten Mal von Borneo nachgewiesen. Ein Bestimmungschlüssel für die Gattungen sowie Schlüssel für alle auf Borneo vorkommenden Arten werden erstellt.

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3 Keys to the Clytrini of Borneo 242
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1 Introduction

Leaf beetles from Borneo have been intensively investigated in the last 30 years, especially from the Malaysian part. Ten species of Clytrini were listed in the catalogue of Mohamedsaid (2004), mostly from Medvedev (1999). New species of Clytrini were added later by Medvedev & Romantsov (2012) and Medvedev (2013).

The present paper is based mostly on materials collected by Pavel Romantsov in Borneo (Sabah) during an expedition in the vicinity of Trus Madi in April 2013. This place is situated about 70 km southeast of Kota Kinabalu and reaches an altitude of 2640 m. The slopes of Mount Trus Madi are covered with rich forest vegetation. Collecting of insects was carried out mainly by means of light traps and hand collecting at an altitude between 1160 and 1250 m, in many cases also by sweeping with a net, both by day and night (referred to as "mowing" on the labels).

Ten species are described as new for science. Furthermore we present taxonomic notes on a few poorly known species. Finally, keys to all Clytrini of Borneo are given.

Acronyms of depositories

HT	Collection of Haruo Takizawa, Saitama, Japan
LM	Collection of Lev. Medvedev, Moscow, Russia
BMNH	British Museum of Natural History, London, United Kingdom
NHMB	Naturhistorisches Museum, Basel, Switzerland
PR	Collection of Pavel Romantsov, Sankt-Petersburg, Russia
IRSNB	Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium
ITBC	Institute for Tropical Biology and Conservation, Universiti Malaysia, Sabah
RR	Collection of Renato Regalin, Milano, Italy.
UKM	Centre for Insect Systematics, Universiti Kebangsaan, Bangi, Malaysia
ZIN	Collection of Zoological Institute RAN, Sankt-Petersburg, Russia

Acknowledgements

Thanks are due to Jan Bezděk (Brno) and an anonymous referee for their valuable suggestions which improved the manuscript, and to R. Regalin (Milano) for providing a photo of the holotype of *Smaragdina kalimantani* (Fig. 36).

2 Taxonomy

Tituboea delectabilis Baly, 1865
(Figs. 10, 42, 43)

Tituboea delectabilis Baly 1865: 45 (Penang); Medvedev 1999: 54 (Sarawak, Kalimantan); Mohamedsaid 2000: 345 (UKM checklist); Mohamedsaid 2004: 29 (catalogue).
Tituboea speciosa Baly 1865: 46 (Penang); Regalin 1997: 109 (= *delectabilis*).

Type material in BMNH, not examined.
Material examined: "Malaysia, N Borneo, Sabah, Keningau dist., Trus Madi Mt., h~1250 m, N 05°26′35″, E 116°27′5″, 24.VIII.2012, A. Klimenko leg.", 1 ♂ (PR).
Distribution: Peninsular Malaysia, Borneo (Sabah, Sarawak, Kalimantan).

Clytrasoma bistripunctata Medvedev, 1999
(Fig. 11)

Clytrasoma bistripunctata Medvedev 1999: 62 (Sabah); Mohamedsaid 2004: 29 (catalogue).

Type material examined: Holotype, labelled "Malaysia, Sabah (Borneo), Sandakan, leg. Baker", 1 ♀ (LM).
Distribution: Borneo (Sabah).

Clytrasoma celebensis borneoensis L. Medvedev, 2013
(Fig. 12)

Clytrasoma celebensis borneoensis Medvedev 2013: 489 (Sabah).

Type material examined: 1 paratype, labelled "Borneo, Malaysia, Sabah, Kimanis Road 16 M from Keningau, Papar, 18.III.1988, leg. T. Niisato", 1 ♀ (LM).
Remarks: In the original description (Medvedev 2013) there are two different spellings of this species: *borneoensis* and *borneensis*; the spelling *borneoensis* is correct.
Distribution: Borneo (Sabah).

Clytrasoma mohamedsaidi Medvedev, 1999

Clytrasoma mohamedsaidi Medvedev 1999: 61 (Sabah); Mohamedsaid 2000: 345 (UKM checklist); Mohamedsaid 2004: 29 (catalogue).

Type material in UKM, not examined.
Distribution: Borneo (Sabah).

Aspidolopha buquetii Lacordaire, 1848
(Figs. 1–3, 37–39, 40, 41)

Aspidolopha buquetii buquetii Lacordaire 1848: 255 (Java, Sumatra, Singapore, Penang, Triganee, Siam, Borneo); Baly 1865: 50 (Java, Sumatra, Singapore, Penang, Tringanee, Siam, Borneo); Mohamedsaid 1993: 5 (as *Aspidolopha melanophthalma*, Sabah); Mohamedsaid 2000: 345 (UKM checklist); Mohamedsaid 2004: 29 (catalogue).
Aspidolopha buquetii egregia Boheman 1859: 154; Medvedev 1999: 55 (Perlis, Pahang, Selangor, Kuala Lumpur, Negeri Sembilan, Sabah).
Aspidolopha buquetii borneensis Medvedev 1985: 96 (Northern Kalimantan [Sabah]).

Type material of *Aspidolopha buquetii* and *A. buquetii egregia* not examined.
Type material examined: Holotype of *Aspidolopha buquetii borneensis*: "Kinabalu"; paratypes of *Aspidolopha buquetii borneensis*: "Nord Borneo, Mont Kina Balu, 8.8.1903, leg. John Waterstradt", 1 ♀ (LM); "Kinubalu, Borneo, 1500 m, H. Rolle, Berlin", 1 ♀ (LM).
Additional material examined: *Aspidolopha buquetii borneensis*: "S. O. Borneo, Grobowsky" "Telang, Borneo, 10.81", 1 ♀ (LM); "Borneo, Matang, Xantus", 1 ♂ (LM).
Remarks: Three subspecies of this species are recorded from Borneo (see Medvedev 1999): *buquetii* s. str., ssp. *egregia* Boheman and ssp. *borneensis* Medvedev which looks strange at first sight and is controversially discussed. The first two forms, having rather large areas, are geographically isolated and are differentiated by the colour of their upperside (see key, chapter 3). The subspecies *borneensis* from Sabah differs from ssp. *egregia* Boheman not only by its coloration (compare Figs. 1, 2 with Fig. 3), but also by the shape of the aedeagus (compare Figs. 37–39 with Figs. 40, 41); it may be supposed that it inhabits different biotopes and altitudes and has a very restricted area in contrast to the widely distributed ssp. *egregia*. However, the pattern of the upperside and the form of the aedeagus are rather variable in this species and all registered subspecies might only be different colour forms which need further investigation. Mohammedsaid (2004) does not accept subspecies of *A. buquetii* and understands them all as synonyms of *Aspidolopha buquetii*, including *A. melanophthalma* Lacordaire, 1848. The status of *Aspidolopha melanophthalma* was already discussed by Medvedev (1985). The second author of the present paper follows Mohammedsaid's view.
Distribution: *Aspidolopha buquetii buquetii*: Java, Bali, South Sumatra, Borneo (South West Kalimantan); *A. b. egregia*: Burma, Thailand, Cambodia, South Vietnam, Peninsular Malaysia, Sumatra (except South), Borneo (Sabah); *A. b. borneensis*: Borneo (Sabah).

Aspidolopha imperialis Baly, 1865
(Figs. 4–7, 73)

Aspidolopha imperialis Baly 1865: 50 (Borneo, Penang); Medvedev 1999: 56 (Perak, Sabah); Mohamedsaid 2000: 345 (UKM checklist); Mohamedsaid 2004: 29 (catalogue).

Type material in BMNH, not examined.
Material examined: "Malaysia, N Borneo, Sabah, Keningau dist., Trus Madi Mt., h~1250 m, N 05°26′35″, E 116°27′5″, 9.IV.2013, at light, P. Romantsov leg.", 1 ♀ (PR).
Remarks: A single female has black pattern on the base of the pronotum, and two bands and almost all mar-

gins of the elytra are black (Fig. 4); such pattern of the upperside was not known before (MEDVEDEV 1999). Spermatheca see Fig. 73.

Distribution: Peninsular Malaysia, Borneo (Sabah, Kalimantan), Sumatra.

Aspidolopha metallescens L. Medvedev, 2013
(Figs. 8, 9, 74, 92–94)

Aspidolopha metallescens MEDVEDEV 2013: 489 (Sabah).

Type material examined: Holotype, labelled "Borneo, Indonesia, 10.5 m Keningau, Crocker Range, 21.–29.III.1989, leg. H. HAYAKAWA", 1 ♂ (HT); 1 paratype, labelled "Malaysia, Sabah, Kimanis Road 16 M from Keningau, Papar, 20.III.1988, leg. T. NIISATO", 1 ♀ (LM).

Additional material examined: "Malaysia, N Borneo, Sabah, Keningau dist., Trus Madi Mt., h~1250 m, N 05°26′35″, E 116°27′5″, 9.IV.2013, at light, P. ROMANTSOV leg.", 1 ♀ (PR); same locality, 24.V.2014, A. KLIMENKO leg., 3 ♂♂ (PR); same as before, but 2.–4.VI.2014, 1 ♀ (PR).

Remarks: This species has the elytra entirely metallic or with a fulvous preapical spot (Figs. 8, 9). Spermatheca see Fig. 74, length of spermatheca 0.52 mm. Aedeagus see Figs. 92–94, length of aedeagus 2 mm.

Distribution: Borneo (Sabah).

Aspidolopha nigricollis L. Medvedev & Romantsov, 2012
(Fig. 13)

Aspidolopha nigricollis MEDVEDEV & ROMANTSOV 2012: 75 (Sabah).

Type material examined: Holotype, labelled "Malaysia, N Borneo, Keningau dist., Trus Madi Mt., h~1500 m, 1–3.V.2006, leg. K. VAKSOV", 1 ♀ (LM). Dorsal view see Fig. 13.

Distribution: Borneo (Sabah).

Pseudolopha nobilis (L. Medvedev, 1988) **n. comb.**
(Fig. 15)

Aspidolopha nobilis MEDVEDEV 1988: 47 (Sabah).

Type material examined: Holotype, labelled "N. Borneo, Kinabalu-Geb[iet]", 1 ♀ (LM). Dorsal view see Fig. 15.

Remarks: This species has the characters of *Pseudolopha* L. Medvedev & Regalin, 1998. It was stated in the original description of this species that the margins of the pronotum and the elytra have short hairs. Higher magnification now showed that also frons, pronotum and elytra are covered with extremely short hairs.

Distribution: Borneo (Sabah).

Pseudolopha borneoensis **n. sp.**
(Figs. 14, 75)

Holotype (♀): "Malaysia, N Borneo, Sabah, Keningau dist., Trus Madi Mt., h~1250 m, N 05°26′35″, E 116°27′5″, 7.IV.2013, at light, P. ROMANTSOV leg." (ZIN).

Paratype: same locality, 9.IV.2013, at light, P. ROMANTSOV leg.", 1 ♀ (PR).

Etymology
The name of the new species refers to the collecting locality.

Description
Background of elytra and pronotum dark, with dull metallic bluish green with golden pubescence which gives an iridescent hue; labrum black; antennae black with 3 basal segments dark fulvous; pronotum with fulvous area at posterior angles; abdomen, trochanters and tibiae except apices fulvous. Dorsal view see Fig. 14.

Body ovate, 1.6 times as long as wide. Clypeus shining, sparsely punctate, frons and vertex dull, finely and very densely punctate, without pubescence, 1.75 times as wide as transverse diameter of eye. Antennae distinctly serrate from the 5th segment on, 1st and 2nd segments thick, 3rd cylindrical, 4th moderately widened to apex. Pronotum 2.2 times as wide as long, broadest at base, anterior angles obtuse, posterior angles rounded, surface very densely and finely punctate, with short pubescence. Scutellum triangular with rounded apex, very densely punctate and pubescent, with impunctate and convex bare area on apex. Elytra 1.3 times as long as wide, slightly narrowed posteriorly, broadly rounded to apex, surface dull, without basal convexity, very densely punctate and finely pubescent. Pygidium finely punctate, with dense golden pubescence. Propleurae with dense white pubescence. Spermatheca as in Fig. 75, length of spermatheca 0.35 mm. Body length 4.9 mm (paratype)–5.0 mm (holotype).

Differential diagnosis
The new species differs from *Pseudolopha splendens* by the fulvous area at the posterior angles of the pronotum and by the smaller size. On differences to other species of the genus see the key (chapter 3).

Distribution
Borneo (Sabah).

Pseudolopha splendens L. Medvedev, 2013

Pseudolopha splendens MEDVEDEV 2013: 490 (Sabah).

Type material in NHMB, not examined.

Distribution: Borneo (Sabah).

Aetheomorpha volkovi **n. sp.**
(Figs. 25, 48–50, 80–82)

Holotype (♂): "Malaysia, N Borneo, Sabah, Keningau dist., Trus Madi Mt., h~1250 m, N 05°26′35″, E 116°27′5″, 10.IV.2013, at light, P. ROMANTSOV leg." (ZIN).

Paratypes: same locality, 5.IV.2013 collected by mowing in the daytime, 1 ♀ (PR); same locality, 8.IV.2013, at light, 1 ♀ (PR); same locality, 9.IV.2013, collected by mowing at night, 1 ♀ (PR); same locality, 10 IV.2013, collected by mowing in the daytime, 1 ♀ (LM); same locality, 11.IV.2013, collected by mowing in the daytime, 1 ♀ (PR).

Etymology

The new species is named after Anatoly Volkov (Moscow), who co-sponsored the expedition to Borneo in the year 2013.

Description (male)

Head, pronotum and scutellum metallic bronze, only anterior margin of labrum fulvous, antennae black with 4 basal segments fulvous. Elytra metallic bronze with large hawk-like fulvous spot in the apical third. Underside fulvous with metallic luster, especially on pygidium, legs black with fulvous trochanters and tibiae. Dorsal view see Fig. 25.

Body parallel-sided. Clypeus impunctate, frons distinctly, but not strongly punctate, without pubescence, vertex very finely and sparsely punctate, interocular space twice as wide as transverse diameter of eye. Antennae serrate from the 5th segment on, 4th segment very feebly triangular. Pronotum twice as wide as long, broadest in basal third, with obtuse anterior and rounded posterior angles, surface strongly and densely punctate on sides, but finely and sparsely in the middle. Scutellum broadly triangular with rounded apex, practically impunctate. Elytra 1.45 times as long as wide, strongly and densely punctate, except apical slope with more fine and sparse punctures. Pygidium exposed, very finely punctate and pubescent. Prosternum pubescent, propleurae bare and nitid. Aedeagus (Figs. 48–50) with finger-like and truncate apical process, very strongly curved downwards, with underside very deeply longitudinally concave, length of aedeagus 1.6 mm. Body length 4.5 mm.

Female: Sides of pronotum fulvous, tibiae black with fulvous base, other colour and sculpture as in male. Spermatheca as in Figs. 80–82, length of spermatheca 0.35–0.40 mm. Body length 5.7–6.0 mm.

Differential diagnosis

The new species is very similar to *Aetheomorpha obscura*, but the latter species has a black head with fulvous labrum, whereas *A. volkovi* has the head entirely metallic bronze coloured. The aedeagi of both species are different, compare Figs. 46, 47 with Figs. 48–50. On differences to other species of the genus see the key (chapter 3).

Distribution

Borneo (Sabah).

Aetheomorpha nigripennis **n. sp.**
(Figs. 24, 78)

Holotype (♀): "Malaysia, N Borneo, Sabah, Keningau dist., Trus Madi Mt., 1230 m, N 05°25′39.4″, E 116°25′43.2″, 9.IV.2013, P. Romantsov leg." (ZIN).

Paratypes: "Malaysia, N Borneo, Sabah, Keningau dist., Trus Madi Mt., h~1250 m, N 05°26′35″, E 116°27′5″ 9.IV.2013, P. Romantsov leg.", 2 ♀♀ (PR). All specimens were collected at light.

Etymology

The name of the new species refers to the almost black elytra.

Description

Head black with labrum and sometimes anterior part of clypeus fulvous, antennae black with 3 basal segments fulvous. Pronotum and scutellum fulvous, elytra almost black, a small area surrounding the scutellum brownish (Fig. 24). Underside with apical part of abdomen and pygidium black, legs black.

Body moderately elongate, almost parallel-sided. Head practically impunctate, except a small area along inner margin of eye with fine punctures and short hairs, frons with 3 round grooves: two before clypeus and a larger one before vertex; interocular space twice as wide as transverse diameter of eye. Antennae serrate from the 4th segment on, which is triangular, as wide as long, and smaller than 5th, next segments distinctly more transverse. Pronotum 2.1 times as wide as long, broadest at base, with obtuse anterior and rounded posterior angles, surface shining, evenly convex and practically impunctate. Scutellum triangular, impunctate. Elytra 1.4 times as long as wide, surface shining, finely and moderately densely punctate, with practically smooth apical slope. Prosternum not pubescent, propleurae smooth and bare. Spermatheca C-like with clubbed ductus (Fig. 78), length of spermatheca 0.4 mm. Body length 5.1–5.3 mm. Pygidium exposed.

Differential diagnosis

The new species is similar to *Aetheomorpha semistriata*, but the elytra of *A. nigripennis* are confusedly punctate, and head and elytra are black. From *A. obscura* it can be distinguished by the entirely fulvous pronotum and black elytra, without any light spots on the disc (except sometimes basally near the sutural area). On differences to other species of the genus see the key (chapter 3).

Distribution

Borneo (Sabah).

Aetheomorpha trusmadiensis **n. sp.**
(Fig. 28)

Holotype (♀): "Malaysia, N Borneo, Sabah, Keningau dist., Trus Madi Mt., h~1250 m, N 05°26′35″, E 116°27′5″, 10.IV.2013, at light, P. Romantsov leg." (ZIN).

Paratype: same locality and date, 1 ♀ (PR).

Etymology

The name of the new species refers to the collecting locality.

Description

Black. Head red with darkened anterior part of clypeus. Antennae black with segments 1–3 more or less fulvous (Fig. 28). Pronotum red with sides feebly darkened. Prosternum and propleurae fulvous. Abdomen fulvous with basal half of first sternite black. Legs black with fulvous coxae and trochanters.

Body elongate, parallel-sided. Head practically impunctate, except a small area along inner margins of eyes with fine punctures and short hairs, frons with a deep groove in the middle and two very feeble ones anteriorly, interantennal space 2.3 times as wide as transverse diameter of eye. Antennae distinctly serrate from the 4th segment on. Pronotum 1.8 times as wide as long, broadest before base, with obtuse anterior and rounded posterior angles, lateral margins rounded, surface shining, convex and practically impunctate. Scutellum triangular, impunctate. Elytra 1.6 times as long as wide, surface finely and rather densely punctate with impunctate apical slope. Prosternum not pubescent, propleurae smooth and bare. Structure of spermatheca unknown (we could not find it in both specimens). Body length 3.9–4.0 mm.

Differential diagnosis

The new species is very similar to *Aetheomorpha nigripennis* n. sp., but differs by distinctly smaller size and almost red head, black scutellum and black metasternum (Fig. 28). On differences to other species of the genus see the key (chapter 3).

Distribution

Borneo (Sabah).

Aetheomorpha semistriata L. Medvedev, 1999
(Figs. 27, 54, 55)

Aetheomorpha semistriata Medvedev 1999: 64 (Bali).

Holotype in NHMB, not examined.

Type material examined: 1 paratype, labelled "Indonesia, Bali, Danau Buyan, 1300 m, 19.–21.II.1994, Bolm". Dorsal view see Fig. 27, aedeagus see Figs. 54, 55.

Distribution: Malacca, Indonesia (Sumatra, Bali), possibly from Borneo.

Aetheomorpha flavoapicalis **n. sp.**
(Figs. 26, 51–53)

Holotype (♂): "Malaysia, N Borneo, Sabah, Keningau dist., Trus Madi Mt., h~1250 m, N 05°26′35″, E 116°27′5″, 7.IV.2013, collected by mowing in the daytime, P. Romantsov leg." (ZIN).

Etymology

The name of the new species refers to its coloration.

Description

Dark bronze, labrum dark fulvous, antennae black with segments 2–4 fulvous, apical slope of elytra light fulvous, tibiae with basal halves fulvous (Fig. 26).

Body parallel-sided. Clypeus smooth, frons densely punctate without pubescence near eyes, vertex very finely and sparsely punctate, interocular space 2.3 times as wide as transverse diameter of eye. Antennae distinctly serrate from the 5th segment on, proportions of segments are as 6-4-3-4, with basal segment thick and 4th segment feebly triangular. Pronotum 1.8 times as wide as long, broadest near base, but rather feebly narrowed anteriorly, with anterior angles obtusely angulate and posterior angles broadly rounded, surface strongly and unevenly punctate, with interspaces mostly larger than punctures. Scutellum triangular with rounded apex, very finely and densely punctate at base, remaining surface shining and practically impunctate. Elytra 1.4 times as wide as long, strongly and densely confusedly punctate, including apex. Pygidium entirely exposed, convex, finely punctate and pubescent. Prosternum pubescent, propleurae bare and nitid. Aedeagus (Figs. 51–53) with triangular apex, strongly curved downwards, length of aedeagus 1.47 mm. Body length 4.7 mm.

Differential diagnosis

The new species is similar to *Aetheomorpha takizawai*, but differs from the latter species by the colour of pronotum, elytra and underside, as well as by larger size (see the key, chapter 3, and compare Figs. 20 and 26).

Distribution

Borneo (Sabah).

Aetheomorpha maculicollis **n. sp.**
(Figs. 22, 44, 45, 77)

Holotype (♂, Fig. 22): "Malaysia, N Borneo, Sabah, Keningau dist., Trus Madi Mt., h~1250 m, N 05°26′35″, E 116°27′5″, 11.IV.2013, collected by mowing in the daytime, P. Romantsov leg." (ZIN).

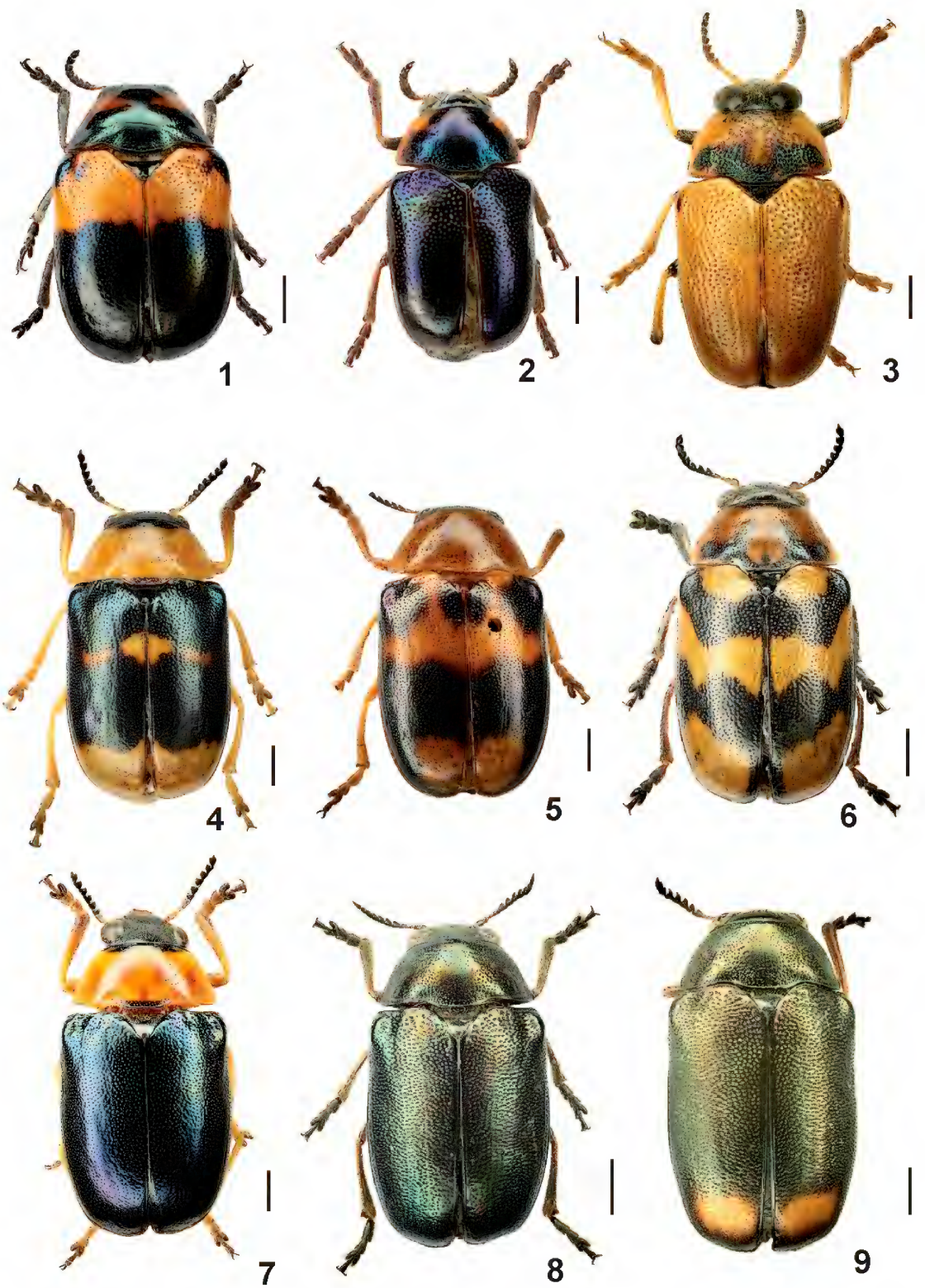
Paratypes: same locality, 9.IV.2013, at light, 5 ♂♂, 2 ♀♀ (LM, PR); same locality, 10.IV.2013, collected by mowing in the daytime, 1 ♀ (LM); same locality, 4.IV.2013, at light, 1 ♀ (LM).

Etymology

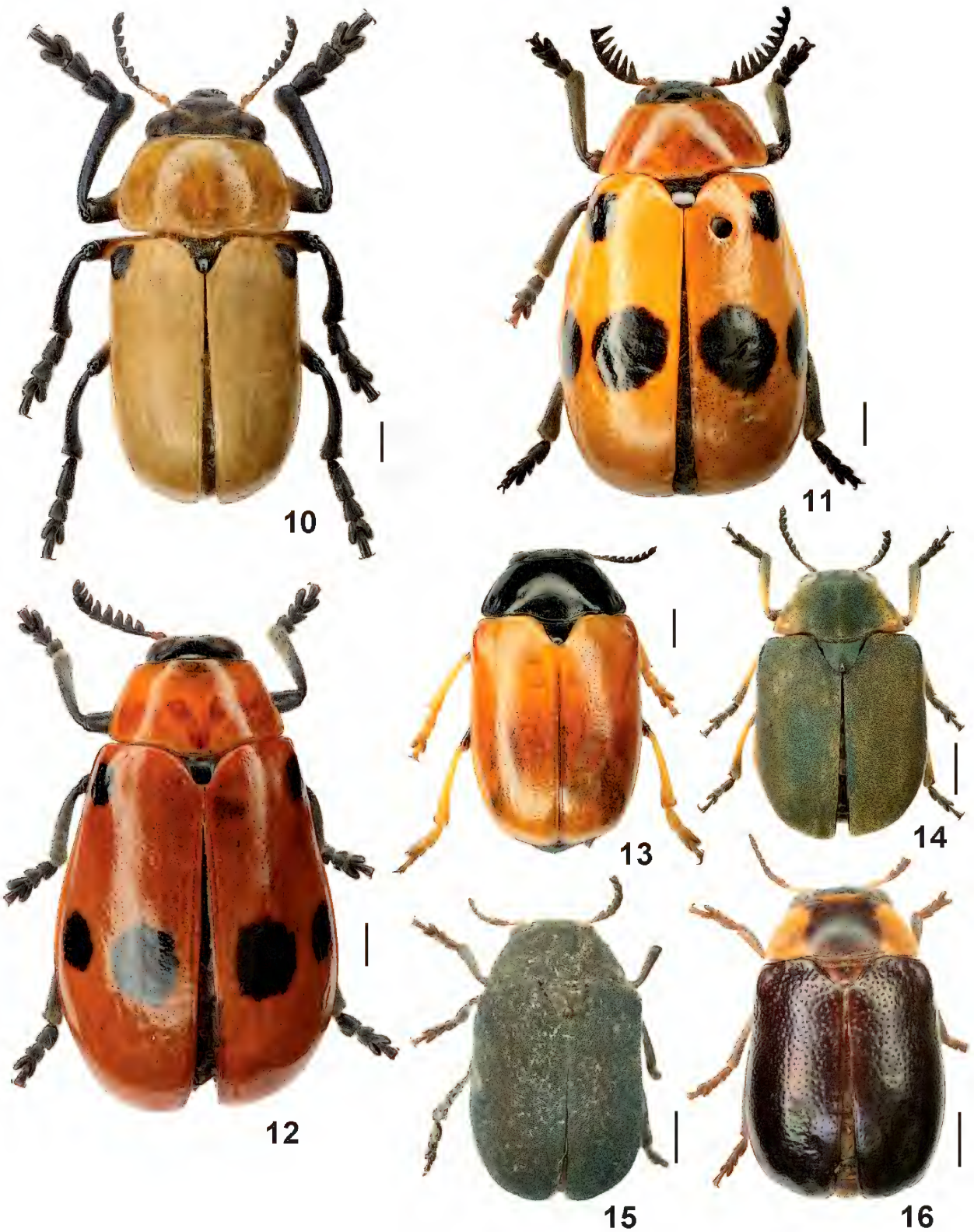
The name of the new species refers to its coloration.

Description

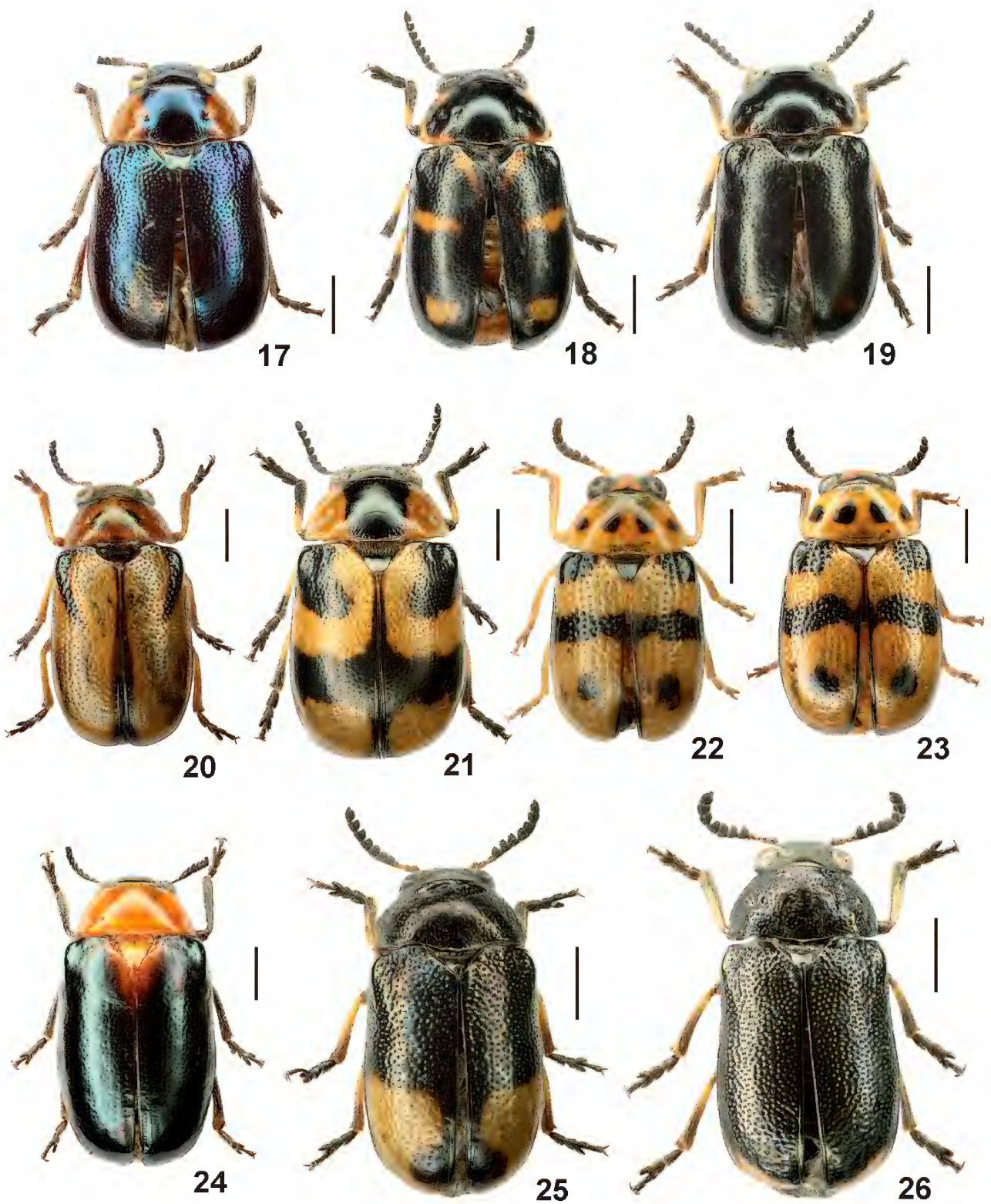
Fulvous; vertex, stripes along eyes, antennae except basal segments 1–3, four spots on pronotum, scutellum, triangular humeral spot, narrow transverse band before the middle of elytra, preapical spot, lateral margin, apex and suture between band and apex, metasternum except pleurae, upperside of apical half of tibiae, tarsi and sometimes middle of the 5th abdominal sternite and apex of pygidium black.



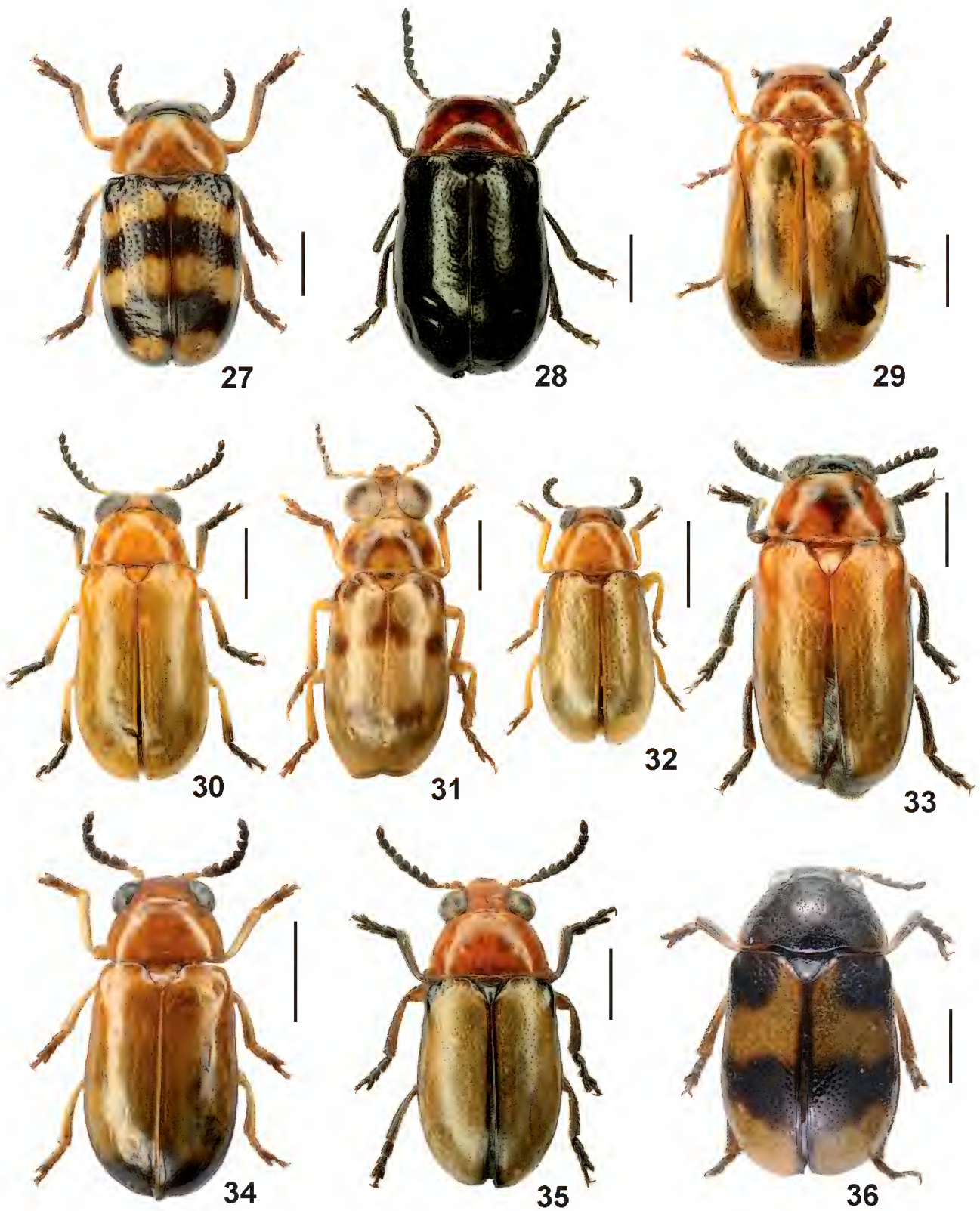
1–9. *Aspidolopha* spp. from Borneo, dorsal views. – **1**, **2**. *A. buquetii borneensis*. **3**. *A. buquetii egregia* (specimen from Thailand). **4–7**. *A. imperialis*. **8**, **9**. *A. metallescens* (9 = holotype). – Scales: 1 mm.



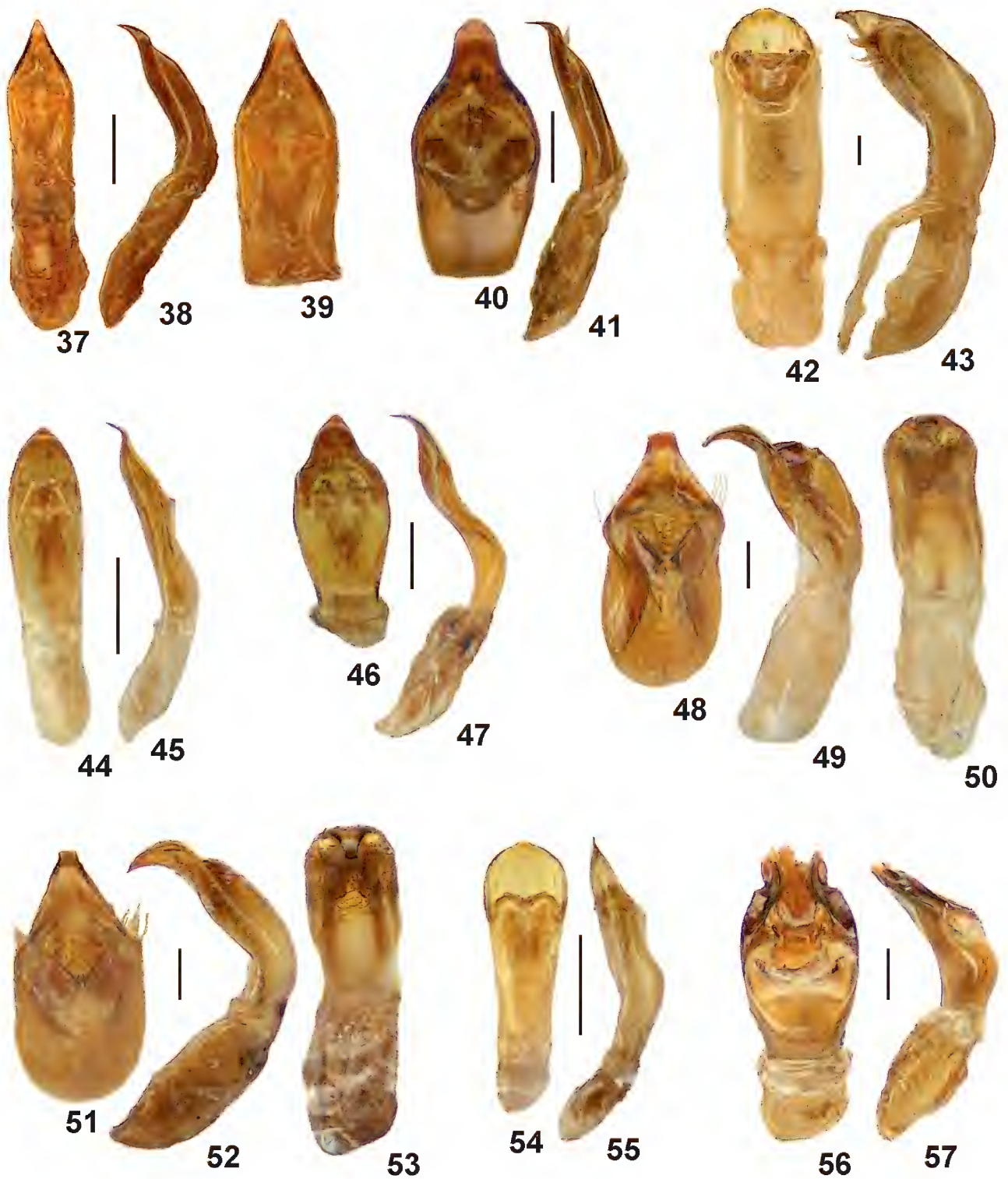
10–16. Chrysomelidae from Borneo, dorsal views. – **10**. *Tituboea delectabilis* (male). **11**. *Clytrasoma bistripunctata*. **12**. *C. celebensis borneoensis*. **13**. *Aspidolopha nigricollis*. **14**. *Pseudolopha borneoensis* n. sp. **15**. *P. nobilis*. **16**. *Aetheomorpha kinabaluensis*. – Scales: 1 mm.



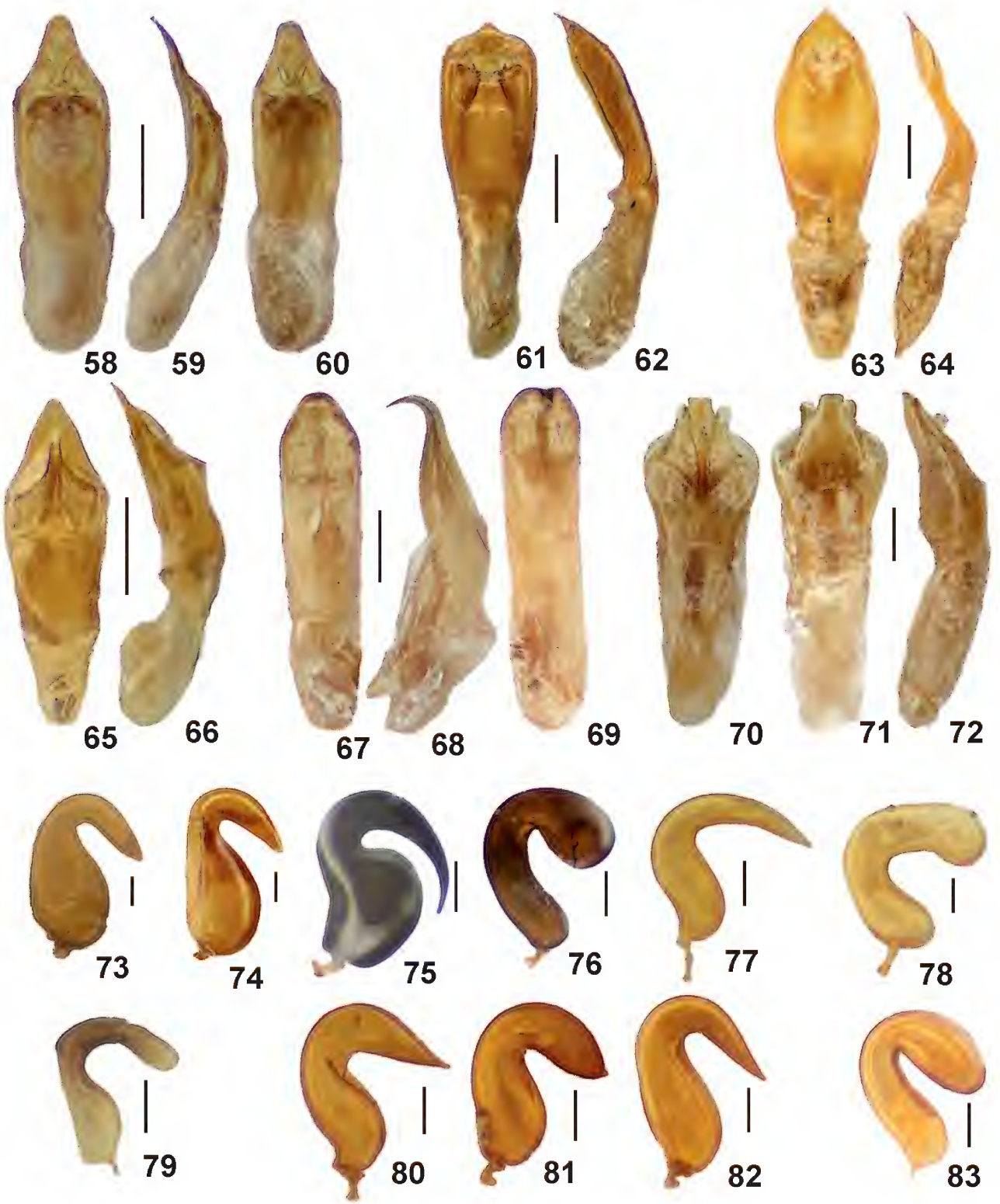
17–26. *Aetheomorpha* spp. from Borneo, dorsal views. – **17**. *Ae. kinabaluensis*. **18**, **19**. *Ae. obscura*. **20**. *Ae. takizawai*. **21**. *Ae. collaris* n. sp. **22**. *Ae. maculicollis* n. sp. **23**. *Ae. similis* n. sp. **24**. *Ae. nigripennis* n. sp. **25**. *Ae. volkovi*. **26**. *Ae. flavoapicalis* n. sp. – Scales: 1 mm.



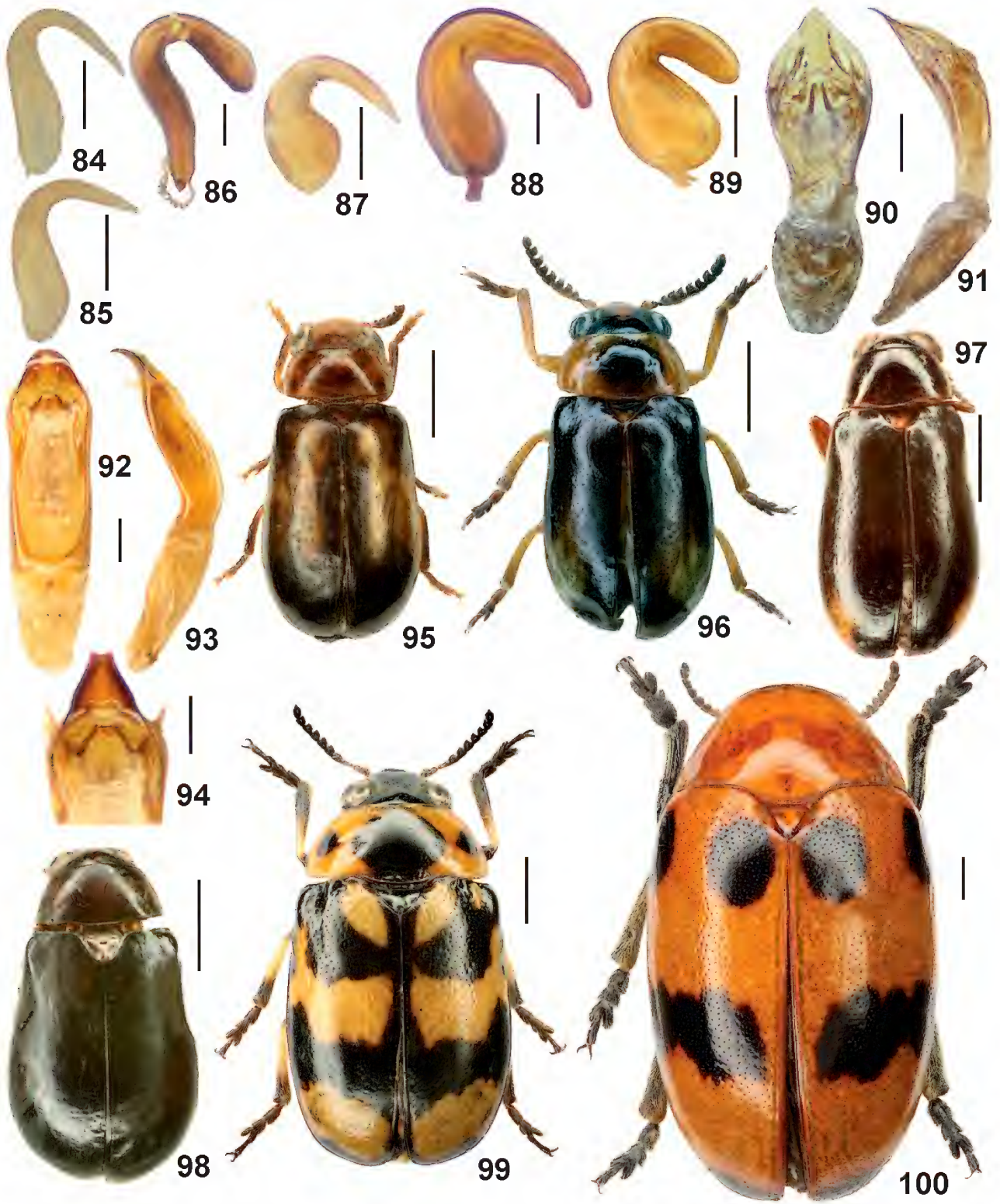
27–36. *Aetheomorpha* spp. and Smaragdina spp. from Borneo, dorsal views. – **27**. *Aetheomorpha semistriata* (paratype). **28**. *Ae. trusmadiensis* n. sp. **29**. *Smaragdina borneensis*. **30**. *S. bakeri*. **31**. *S. brunneonotata*. **32**. *S. linearis*. **33**. *S. nigricapitis* n. sp. **34**. *S. sabahensis*. **35**. *S. trifoveata* n. sp. **36**. *S. kalimantani* (photo R. Regalin). – Scales: 1 mm.



37–57. Chrysomelidae from Borneo, aedeagi, dorsal (37, 42, 44, 46, 51, 54, 56), lateral (38, 41, 43, 45, 47, 48, 49, 52, 55, 57), and ventral (50, 53) views, apices (39, 40). – **37–39**. *Aspidolopha buquetii borneensis*. **40**, **41**. *A. b. egregia* (specimen from Thailand). **42**, **43**. *Tituboea delectabilis*. **44**, **45**. *Aetheomorpha maculicollis* n. sp. **46**, **47**. *Ae. obscura*. **48–50**. *Ae. volkovi*. **51–53**. *Ae. flavoapicalis* n. sp. **54**, **55**. *Ae. semistriata*. **56**, **57**. *Ae. takizawai*. – Scales: 0.25 mm.



58–83. Chrysomelidae from Borneo, aedeagi, dorsal (58, 63, 65, 67, 70), lateral (59, 62, 64, 66, 68, 72), and ventral (60, 69, 71) views, apex (61), and spermathecae (73–83). – **58–60**. *Smaragdina sabahensis*. **61**, **62**. *S. bakeri*. **63**, **64**. *S. brunneonotata*. **65**, **66**. *S. linearis*. **67–69**. *S. trifoveata* n. sp. **70–72**. *S. nigricapitis* n. sp. **73**. *Aspidolopha imperialis*. **74**. *A. metallescens*. **75**. *Pseudolopha borneoensis* n. sp. **76**. *Aetheomorpha collaris* n. sp. **77**. *Ae. maculicollis* n. sp. **78**. *Ae. nigripennis* n. sp. **79**. *Smaragdina sabahensis*. **80–82**. *Aetheomorpha volkovi* n. sp. **83**. *Ae. kinabaluensis*. – Scales: 0.1 mm (73–83), 0.25 mm (58–72).



84–100. Chrysomelidae from Borneo, spermathecae (84–89), aedeagi, dorsal (90, 92) and lateral (91, 93) views, apex (94), and dorsal views of the beetles (95–100). – **84**, **85**. *Smaragdina bakeri*. **86** *Aetheomorpha similis* n. sp. **87**. *Smaragdina* sp. **88**. *Aetheomorpha ornatula*. **89**. *Ae. coerulea*. **90, 91**. *Smaragdina flavovariegata*. **92–94**. *Aspidolopha metallescens*. **95**. *Smaragdina* sp. **96**. *S. flavovariegata* (holotype). **97**, **98**. *Smaragdina tristis*. **99**. *Aetheomorpha ornatula*. **100**. *Clytra duodecimmaculata*. – Scales: 0.1 mm (84–89), 0.25 mm (90–94), 1 mm (95–100).

Body cylindrical (male) or slightly ovate (female). Head impunctate, except triangular areas near eyes which are finely punctate and pubescent. Antennae distinctly serrate from the 5th segment on, 4th segment much smaller, triangular. Pronotum twice as wide as long, broadest before base, anterior and posterior angles rounded, surface convex, shining, with very sparse microscopically small punctures. Scutellum triangular, smooth. Elytra with epipleural lobe and moderately strong punctures arranged in irregular rows, more distinct near suture; apical slope almost impunctate. Pygidium distinctly exposed, especially in female. Aedeagus with acute triangular apex with apical tip curved downwards (Figs. 44, 45), length of aedeagus 0.8 mm. Spermatheca U-like, with very thin and acute apical end (Fig. 77), length of spermatheca 0.33 mm. Body length of male 3.2–3.6 mm, of female 4.0–4.3 mm.

Differential diagnosis

The new species differs from most Oriental species by having four round black spots in a transverse row on the pronotum. A few continental and Philippine species sometimes also have four spots on the pronotum, but they are not round and mostly placed near the base, moreover these species have other elytral pattern and a different shape of the aedeagus. *Aetheomorpha maculicollis* n. sp. also bears some resemblance to *A. jacobyi* L. Medvedev, 1988 from North India, Bhutan and Laos, but clearly differs by other elytral pattern, especially by the preapical elytral spot, and by a different shape and sculpture of the aedeagus. On the difference to the very near species *A. similis* n. sp. see below.

Distribution

Borneo (Sabah).

Aetheomorpha similis **n. sp.**
(Figs. 23, 86)

Holotype (♀): "Malaysia, N Borneo, Sabah, Keningau dist., Trus Madi Mt., h~1250 m, N 05°26′35″, E 116°27′5″, 10.IV.2013, at light, P. Romantsov leg." (ZIN).

Etymology

The new species is named after its similarity to the preceding species.

Description

Coloration nearly identical to the preceding species, only labrum black (Fig. 23).

Body broadly ovate. Structure of head, antennae, pronotum and scutellum same as in the preceding species. Elytra 1.2 times as long as wide, with feeble epipleural lobes and moderately strong and dense confused punctures, without any trace of rows. Pygidium entirely exposed. Spermatheca U-like, of same thickness along its length, ductus simple basally, spiraled distally (Fig. 86), length of spermatheca 0.42 mm. Body length 4.9 mm.

Differential diagnosis

Very similar to the preceding species, but differing by the black labrum, confused elytral punctures, larger size and especially the other form of the spermatheca (compare Figs. 77 and 86).

Distribution

Borneo (Sabah).

Aetheomorpha collaris **n. sp.**
(Figs. 21, 76)

Holotype (♀): "Malaysia, N Borneo, Sabah, Keningau dist., Trus Madi Mt., h~1250 m, N 05°26′35″, E 116°27′5″, 9.IV.2013, collected by mowing at night, P. Romantsov leg." (ZIN).

Paratypes: same locality, 7.IV.2013, 1 ♀ (PR); same locality, 5.IV.2013, collected by mowing at night, 1 ♀ (PR).

Etymology

The name of the new species refers to the coloration of the pronotum.

Description

Head black with fulvous anterior part of labrum, antennae black with 3 basal segments fulvous, pronotum fulvous with black central stripe, very distinctly widened at anterior margin, scutellum black, elytra fulvous with large humeral area, transverse band behind middle, apex and all margins narrowly black (Fig. 21), pygidium fulvous with apex more or less black, underside fulvous with inner part of propleurae and apex of apical abdominal sternite black, legs black with tibiae and base of femora fulvous.

Body elongate, slightly ovate. Head finely punctate on clypeus and more strongly on frons, vertex practically impunctate, inner margin of eyes pubescent, interantennal space about twice as wide as transverse diameter of eye. Antennae serrate from the 5th segment on, 4th segment practically cylindrical. Pronotum twice as wide as long, broadest before base, lateral margins feebly rounded, anterior angles obtuse, posterior angles rounded, surface shining, impunctate except fine punctures along hind margin. Scutellum triangular, impunctate. Elytra 1.3 times as long as wide, surface with dense, moderately strong and entirely confused punctures, except almost impunctate apical slope. Prosternum not pubescent, propleurae smooth and bare. Spermatheca C-like with globular basal part, ductus thin, long and spiraled (Fig. 76), length of spermatheca 0.35 mm. Body length 5.4–5.8 mm.

Differential diagnosis

The new species is very similar to *Aetheomorpha ornatula* Baly, 1865 from Singapore and Peninsula Malaysia, but *A. ornatula* has – instead of a stripe – the prono-

tum with a large black spot which is connected with the front and basal margins, an additional small black spot at each side, and the elytra with a more developed black area which includes shoulder, narrow stripes along the basal margin and scutellum, as well as a black band from the shoulder to the suture (compare Figs. 21 and 99); moreover, its spermatheca is U-like (Fig. 88).

Distribution

Borneo (Sabah).

Aetheomorpha obscura L. Medvedev, 2013
(Figs. 18, 19, 46, 47)

Aetheomorpha obscura Medvedev 2013: 491 (Sabah).

Type material examined: Holotype, labelled "N. Borneo, Kinabalu, 5000–6000 ft, leg. A. Dodge & G. Goss", 1 ♂ (LM).

Additional material examined: "Malaysia, N Borneo, Sabah, Keningau dist., Trus Madi Mt., h~1250 m, N 05°26′35″, E 116°27′5″, 7.IV.2013, at light, P. Romantsov leg.", 1 ♂ (PR); same locality, 9.IV.2013, at light, 1 ♂ (PR).

Remarks: Only a single male from Kinabalu was known before; it has the elytra with a dark fulvous band before the middle and a fulvous spot on the apical slope. One specimen from Trus Madi has darker elytra with a very small fulvous spot on the apical slope, but the other specimen has a basal stripe along the scutellum, a distinct band before the middle and a fulvous preapical spot (Figs. 18, 19). The body length of these specimens is 4.0–4.4 mm, while the holotype is 4.5 mm long. All three known specimens have the same form and sculpture of the aedeagus (Figs. 46, 47), length of the aedeagus 1.25 mm.

Distribution: Borneo (Sabah).

Aetheomorpha takizawai L. Medvedev, 2013
(Figs. 20, 56, 57)

Aetheomorpha takizawai Medvedev 2013: 490 (Sabah).

Holotype in ITBC, not examined.

Type material examined: 3 paratypes, labelled "Malaysia, Sabah, TM tower, Kimanis, Papar, 27.III.2008, leg. H. Takizawa", 1 ♂ (LM); "Malaysia, Sabah, Gunung Emas, Crocker Mts., 22.IV.1993, leg. Jenis & Strba", 1 ♀ (LM); "Borneo, Sabah, Crocker Range N. P., Gunung Emas, 6.–18.VI.1996, 1500–1700 m, leg. J. Kodada", 1 ♀ (LM).

Distribution: Borneo (Sabah).

Aetheomorpha kinabaluensis L. Medvedev, 2013
(Figs. 16, 17, 83)

Aetheomorpha kinabaluensis Medvedev 2013: 491 (Sabah).

Holotype (♀) in ITBC, not examined, labelled "Sabah, UMS hill, Kota Kinabalu, 6.V.2007, leg. H. Takizawa", with a small fulvous spot on the apex of the elytra.

Type material examined: 1 paratype, labelled "Borneo, Kinabalu", 1 ♀ (LM), elytra entirely metallic.

Additional material examined: "N. Borneo, Kinabalu Geb.", 1 ♀ (LM); "Nord Borneo, Mont Kina Balu, 8.8.1903, leg. John Waterstradt", 1 ♀ (LM), both with entirely metallic elytra.

Remarks: The record of the continental *Aetheomorpha coerulea* Jacoby, 1802 (Medvedev 1999, 2013; Mohamedsaid 1993, 2004) from Borneo is incorrect and refers in reality to *A. kinabaluensis*. This species differs from *A. coerulea* Jacoby in the entirely black clypeus and femora, the entirely fulvous underside, the spermatheca with the basal branch shorter and 1.5 times as thick as the apical branch (Fig. 83), and the slightly larger body length (4.9–5.5 mm). *A. coerulea* has clypeus and femora fulvous, and meso- and metathorax metallic blue; spermatheca see Fig. 89.

Distribution: Borneo (Sabah).

Smaragdina trifoveata **n. sp.**
(Figs. 35, 67–69)

Holotype (♂): "Malaysia, N Borneo, Sabah, Keningau dist., Trus Madi Mt., h~1250 m, N 05°26′35″, E 116°27′5″, 9.IV.2013, P. Romantsov leg." (ZIN).

Paratype: same locality, 11.IV.2103, collected by mowing in the daytime, 1 ♀ (PR).

Etymology

The name of the new species refers to the sculpture of the head.

Description

Head and pronotum red fulvous, antennae black with 3 basal segments fulvous, scutellum black, elytra pale flavous with lateral margin and apex black (lateral margin very narrow, apex broader and poorly delimited), underside including pygidium black, legs black with fulvous femora and underside of tibiae (Fig. 35).

Head finely punctate on frons and more distinctly on vertex, with 3 distinct grooves: two on frons and a deeper one on vertex; interocular space about 1.15 times (male) and 1.3 times (female) as wide as transverse diameter of eye. Antennae distinctly serrate from the 4th segment on, which is almost same in size as the 5th, but more triangular. Pronotum 1.8 times as wide as long, with all angles rounded, surface convex, very finely and sparsely punctate. Scutellum triangular. Elytra 1.45 times as long as wide, finely and confusedly punctate. Apex of pygidium broadly rounded. Segment 1 of anterior tarsus not widened. Aedeagus with triangular and very acute apex curved downwards, underside evenly convex (Figs. 67–69), length of aedeagus 1.12 mm. Body length 3.9 mm (male), 4.5 mm (female).

Differential diagnosis

The new speciese differs well from all species from Malaysia by a combination of trifoveate head, elytral pat-

tern and the shape of the aedeagus. It resembles a bit a female of an undescribed species from Kalimantan which has also has three grooves on the head (see MEDVEDEV 1999).

Distribution

Borneo (Sabah).

Smaragdina tristis L. Medvedev, 1999
(Figs. 97, 98)

Smaragdina tristis MEDVEDEV 1999: 68 (Sabah); MEDVEDEV 2013: 492 (Sarawak); MOHAMEDSAID 2000: 345 (UKM checklist); MOHAMEDSAID 2004: 29 (catalogue).

Type material examined: Holotype, labelled "Sandakan, Borneo, BAKER", 1 ♂ (LM). Dorsal view see Fig. 97.

Additional material examined: "Sarawak, Semongok, 12 mi. S. Kuching 10.XII.1974, A. EARNSHAW", 1 ♀ (LM). Dorsal view see Fig. 98.

Distribution: Borneo (Sabah, Sarawak).

Smaragdina nigricapitis **n. sp.**
(Figs. 33, 70–72)

Holotype (♂): "Malaysia, N Borneo, Sabah, Keningau dist., Trus Madi Mt., h~1250 m, N 05°26′35″, E 116°27′5″, 9.IV.2013, P. ROMANTSOV leg." (ZIN).

Paratype: same locality, 11.IV.2013, collected by mowing in the daytime, 1 ♂ (PR).

Etymology

The name of the new species refers to the coloration of the head.

Description

Fulvous, head black, antennae black with 3 basal segments fulvous, elytra with wide darkened sides and apex, underside fulvous with two darkened areas on metasternum and apex of abdomen black, pygidium darkened, legs black with bases of femora and tibiae fulvous (Fig. 33). Darkening of the lateral sides of the elytra narrower in the paratype than in the holotype.

Head with frons distinctly punctate near eyes and pubescent, other parts of head almost impunctate, without grooves on flat frons and convex vertex, interocular space practically twice as wide as transverse diameter of eye. Antennae distinctly serrate from the 4th segment on, which is only a little smaller than the 5th. Pronotum 1.6 times as wide as long, broadest near base, all angles rounded, surface convex, impunctate. Scutellum triangular. Elytra 1.8 times as long as wide, with dense and strong confused punctures, partly arranged in irregular rows, but very feeble on apical slope. Pygidium broadly rounded on apex. Segment 1 of anterior tarsus not widened. Aedeagus as in Figs. 70–72, length of aedeagus 1.5 mm. Body length 4.4 mm.

Differential diagnosis

The new species is similar to *Smaragdina luteicollis* Lacordaire, 1848 from Java and Sumatra, from which it differs by the entirely black head and entirely fulvous elytra.

Distribution

Borneo (Sabah).

Smaragdina bakeri L. Medvedev, 1999
(Figs. 30, 61, 62, 84, 85)

Smaragdina bakeri MEDVEDEV 1999: 69 (Sabah); MOHAMEDSAID 2000: 345 (UKM checklist); MOHAMEDSAID 2004: 29 (catalogue).

Type material examined: Holotype, labelled "Malaysia, Sabah (Borneo), Sandakan, BAKER", 1 ♂ (LM).

Additional material examined: "Malaysia, N Borneo, Sabah, Keningau dist., Trus Madi Mt., h~1250 m, N 05°26′35″, E 116°27′5″, 9.IV.2013, at light, P. ROMANTSOV leg.", 1 ♂, 1 ♀ (LM), 1 ♂ (PR); same locality and date, collected in the daytime, 1 ♀ (LM); same locality, 6.IV.2013, at light, 1 ♂, 5 ♀♀ (PR); same locality, 10.IV.2013, 1 ♀ (PR).

Remarks: We provide figures of the aedeagus (Figs. 61, 62) and figures of the hitherto unknown spermatheca (Figs. 84, 85); length of aedeagus 1.3 mm, length of spermatheca 0.22–0.27 mm. Dorsal view see Fig. 30.

Distribution: Borneo (Sabah).

Smaragdina borneensis L. Medvedev, 2013
(Fig. 29)

Smaragdina borneensis MEDVEDEV 2013: 491 (Sabah).

Holotype (♂) in ITBC, not examined.

Type material examined: 1 paratype, labelled "Malaysia, Sabah: Kinabalu Park, HQ Ranaw, 14–15.IV.2008, leg. H. TAKIZAWA", 1 ♀ (LM). Dorsal view see Fig. 29.

Distribution: Borneo (Sabah).

Smaragdina sabahensis L. Medvedev, 1999
(Figs. 34, 58–60, 79)

Smaragdina sabahensis MEDVEDEV 1999: 68 (Sabah); MOHAMEDSAID 2000: 345 (UKM checklist); MOHAMEDSAID 2004: 29 (catalogue).

Type material examined: Holotype, labelled "Malaysia, Sabah (Borneo), Sandakan, BAKER", 1 ♂ (LM); paratypes, same locality, 4 ♀♀ (LM).

Additional material examined: "Malaysia, N Borneo, Sabah, Keningau dist., Trus Madi Mt., h~1250 m, N 05°26′35″, E 116°27′5″, 9.IV.2013, collected by mowing in the daytime, P. ROMANTSOV leg.", 2 ♀♀ (LM, PR); same locality, "06.IV.2013, at light, P. ROMANTSOV leg.", 1 ♂ (PR).

Remarks: This species was known only from East Sabah (Sandakan). We provide figures of the aedeagus

(Figs. 58–60) and of the spermatheca (Fig. 79); length of aedeagus 0.9 mm, length of spermatheca 0.27 mm. Dorsal view see Fig. 34.

Distribution: Borneo (Sabah).

Smaragdina brunneonotata L. Medvedev, 1999
(Figs. 31, 63, 64)

Smaragdina brunneonotata Medvedev 1999: 69 (Sabah).

Type material examined: Holotype, labelled "Indonesia, Kalimantan Barat, Gunung Palung Nat. Park, T. Surov leg.", 1 ♂ (LM). Dorsal view see Fig. 31, aedeagus see Figs. 63, 64.

Additional material examined: "Malaysia, S Borneo, Sabah, Nabawan dist., ~7 km N Pensiangan vill., h~530 m, N 04°35′16″, E 116°19′27″, 01.III.2014, P. Romantsov leg.", 1 ♂ (PR).

Distribution: Borneo (Kalimantan, Sabah).

Smaragdina kalimantani L. Medvedev & Regalin, 1998
(Fig. 36)

Smaragdina kalimantani Medvedev & Regalin 1998: 17 (Indonesia: Kalimantan).

Type material in RR, not examined.

Remarks: The description is based on a male from West Kalimantan ("Indonesia: Kalimantan occ, NG. Sarawai distr., Totang"). We assume that this species might also be found on the Malaysian part of Borneo.

Distribution: Indonesia, Sarawai (Melawi).

Smaragdina linearis L. Medvedev & Kantner, 2002
(Figs. 32, 65, 66)

Smaragdina linearis Medvedev & Kantner 2002: 265 (Sabah); Medvedev 2013: 492 (Sabah, Sarawak).

Holotype in NHMB, not examined.

Type material examined: 2 paratypes, labelled "Malaysia-Sabah, Gunung Emas, Crocker Mts., 22.IV.1993, leg. Jenis & Strba", 1 ♂, 1 ♀ (LM).

Additional material examined: "Malaysia, Sabah, Kg., Kabayau, Telipok, Kota Kinabalu, 15.X.2007, H. Takizawa", 1 ♀ (LM); "Malaysia, N Borneo, Sabah, Keningau dist., Trus Madi Mt., h~1250 m, N 05°26′35″, E 116°27′5″, 8.IV.2013, collected by mowing in daytime, P. Romantsov leg.", 1 ♂ (PR).

Remarks: The species has a very feebly darkened lateral margin of the elytron in the anterior half. Dorsal view see Fig. 32, aedeagus see Figs. 65, 66; length of aedeagus 0.9 mm.

Distribution: Borneo (Sabah); Medvedev's (2013) record of this species from Sarawak actually refers to Sabah.

Clytra duodecimmaculata (Fabricius, 1775)
(Fig. 100)

Cryptocephalus decemmaculatus Fabricius 1775: 106 ("Cape of Good Hope").

Type material not examined.

Material examined: A single specimen with the label "Borneo, coll. Duvivier" was found in IRSNB.

Remarks: This species is widely distributed in SE Asia, but recorded for the first time from Borneo. Dorsal view see Fig. 100.

Distribution: Myanmar, Indochina, South China, Sumatra, Java, Timor, Sumba, Borneo (Sabah).

3 Keys to the Clytrini of Borneo

Key to genera

1 Frons and vertex with dense erect hairs. Antennae sharply serrate, almost pectiniform, segments 6–10 about 3 times as wide as long. – Epipleurae very short, reaching to the middle of metasternum. Elytra of male strongly dilated in the middle. Pygidium covered by elytra. Tarsi broad, second segment broader than long. Body length 9–15 mm. ..... ***Clytrasoma*** Jacoby 1908

– Frons and vertex glabrous or with short, mostly adpressed pubescence. Antennae moderately serrate, segments 6–10 not more than twice as wide as long. **2**

2 Anterior legs of male elongate, head of male enlarged. First antennal segment widened. – Propleurae pubescent. Pygidium covered by elytra..... ***Tituboea*** Lacordaire, 1848

– Anterior legs of male not elongate and head of male not enlarged. First antennal segment not or feebly widened..... **3**

3 Pygidium not covered by elytra. **4**

– Pygidium covered by elytra. **6**

4 Propleurae not pubescent. Prosternal triangle usually not or at most sparsely pubescent. Epipleural lobe of elytra feeble, epipleurae not vertical. Hind angles of pronotum broadly rounded. – This genus is poorly distinguished from *Smaragdina* (see alternative to couple 6). ..... ***Aetheomorpha*** Lacordaire, 1848

– Propleurae pubescent. Prosternal triangle between coxae, pleural suture and anterior margin with dense adpressed pubescence. Elytra with well developed epipleural lobe, epipleurae almost vertical. Pronotum with broadly rounded hind angles, often punctate. – Apex of pygidium mostly emarginate in female. Head with pubescent stripes along eyes, sometimes connected on frons. Body narrowed anteriorly and posteriorly. **5**

5 Upperside not pubescent. ..... ***Aspidolopha*** Lacordaire, 1848

– Upperside with short pubescence (longer on sides)..... ***Pseudolopha*** L. Medvedev & Regalin, 1998

6 Prosternal triangle between coxae, pleural suture and anterior margin of propleurae with dense adpressed pubescence. Pronotum with narrowly rounded hind angles. Tibiae thick. ..... ***Clytra*** Laicharting, 1781

– Propleurae not pubescent. Hind angles of pronotum broadly rounded. Tibiae thin. – Some species are transitional to *Aetheomorpha*. ..... ***Smaragdina*** Chevrolat, 1836

Clytrasoma Jacoby, 1908

1 Antennae 11-segmented with immobile appendix. Body black, pronotum and elytra fulvous, each elytron with moderately large humeral spot and two spots behind the middle black, propleurae black with fulvous lateral margin. – Elytra of female widened posteriorly, with maximal width in apical third, 1.5 times as long as wide. Body length 11.3–11.6 mm. Male unknown. – Borneo (Sabah, Sarawak). ..... ***C. celebensis borneoensis*** L. Medvedev, 2013

– Antennae 12-segmented with mobile 12th segment. Body fulvous, head, venter and legs black, elytra with three black spots (humeral and two median ones)..... **2**

2 Male: Elytra not widened, distinctly punctate, 1.5 times as long as wide and 1.35 times as wide as pronotum. 12th antennal segment truncate. Propleurae black with fulvous lateral margin. Body length 14.8 mm. Aedeagus without any impressions on upperside, with two shallow grooves on underside before apex. – Female unknown, but almost certainly without widened elytra. – Borneo (Sabah)..... ***C. mohamedsaidi*** L. Medvedev, 1999

– Female: Elytra distinctly widened, feebly punctate, 1.25 times as wide as long, 1.6 times as wide as pronotum. 12th antennal segment not truncate at apex. Propleurae fulvous. Body length 9.0–10.6 mm. – Male unknown, but almost certainly with strongly widened elytra. – Borneo (Sabah)..... ***C. bistripunctata*** L. Medvedev, 1999

Tituboea Lacordaire, 1848

Only one species treated, *T. delectabilis* Baly, 1865: Body fulvous; head, antennae except basal segments, scutellum, three spots (sometimes reduced to humeral one) on elytra, knees, tibiae and tarsi black with more or less distinct metallic luster. Aedeagus as in Figs. 42, 43, length of aedeagus 2.9 mm. Body length 8.4–10.6 mm. – Borneo (Sabah, Sarawak, Kalimantan), Malacca, Sumatra (*Tituboea speciosa* Baly, 1865).

Aspidolopha Lacordaire, 1848

1 Body length less than 6.0 mm. Scutellum with distinct sharp central ridge. Frons with dense hair stripes along eyes..... **2**

– Body length more than 6.0 mm. Scutellum without or with a very weak central ridge. Frons without dense hair stripes along eyes..... **4**

2 Hind part of elytra (or sometimes entire elytra) metallic blue, humeral spot present or absent (Figs. 1, 2). – Pronotum with large basal band and usually with darkened anterior margin. Aedeagus as in Figs. 37–39. – Borneo (Sabah).. ***A. buquetii borneensis*** L. Medvedev, 1999

– Elytra with humeral spot and 1–2 transverse bands (sometimes strongly reduced)..... **3**

3 Elytra with transverse humeral spot and two well developed bands. Pronotum with broad basal band. – Java, Bali, South Sumatra, Borneo (South West Kalimantan)..... ***A. buquetii buquetii*** Lacordaire, 1848

– Elytra with round humeral spot and (often reduced) median band; preapical band reduced to a spot or absent (Fig. 3). Pronotum with basal band reduced or absent. – Aedeagus as in Figs. 40–41. – Burma, Thailand, Cambodia, South Vietnam, Peninsular Malaysia, Sumatra (except South), Borneo (Sabah)..... ***A. buquetii egregia*** Boheman, 1859

4 Body elongate, punctuation of pronotum and elytra denser, wrinkled; upper side entirely metallic or elytra with fulvous preapical spot (Figs. 8, 9). – Body length 5.7–6.7 mm. – Borneo (Sabah)..... ***A. metallescens*** L. Medvedev, 2013

– Body broader, pronotum and elytra shining..... **5**

5 Pronotum entirely black, extremely shallowly punctured. Elytra fulvous, shining, with moderately dense punctures (Fig. 13). Body length 7.8 mm. – Borneo (Sabah)..... ***A. nigricollis*** L. Medvedev & Romantsov, 2012

– Pronotum fulvous or bicolour, distinctly punctate. Elytra never entirely fulvous, more densely punctate (Figs. 4–7). Body length 6.9–7.4 mm. – Borneo (Sarawak, Kalimantan), Peninsular Malacca, Sumatra. ..... ***A. imperialis*** Baly, 1865

Pseudolopha L. Medvedev & Regalin, 1998

1 Upperside entirely dark bluish without an iridescent tint (Fig. 15). – Body length 5.2 mm. – Borneo (Sabah)..... ***P. nobilis*** (L. Medvedev, 1988) (n. comb.)

– Upperside with fulvous pattern on pronotum or elytra..... **2**

2 Upperside dark metallic purple with fulvous apices of elytra. Body length 8.3 mm. – Borneo (Sabah)..... ***P. splendens*** L. Medvedev, 2013

– Upperside dark and dull metallic bluish green with fulvous area at posterior angles of pronotum and golden pubescence which gives an iridescent tint (Fig. 14). Body length 4.9–5.0 mm. – Borneo (Sabah)..... ***P. borneoensis*** **n. sp.**

Aetheomorpha Lacordaire, 1848

1 Pronotum unicoloured..... **2**

– Pronotum bicoloured (in male *A. volkovi* pronotum dark bronze with very narrow, poorly visible fulvous lateral margins)..... **7**

2 Pronotum metallic. Antennae serrate from the 5th segment on..... **3**

– Pronotum fulvous or red..... **4**

3 Pronotum metallic blue or greenish blue, finely and sparsely punctate. Elytra fulvous, with humeral area (sometimes prolonged in oblique stripe) and all margins narrowly dark metallic. Underside dark fulvous to piceous. Body length 3.9–4.2 mm. – Borneo (Sabah)..... ***A. takizawai*** L. Medvedev, 2013, male

– Pronotum metallic bronze, strongly punctate. Elytra metallic bronze with fulvous apex. Underside metallic bronze. Body length 4.7 mm. – Female unknown. – Borneo (Sabah)..... ***A. flavoapicalis*** **n. sp.**

4 Head metallic blue. – Elytra see couplet 3. Body length 4.5–5.9 mm. See also couplet 10. – Borneo (Sabah)..... ***A. takizawai*** L. Medvedev, 2013, female

– Head not metallic..... **5**

5 Elytra with irregular rows of punctures, black with three fulvous bands. Antennae serrate from the 5th segment on. – Head yellow, with labrum, vertex and stripes along eyes black (Fig. 27). Underside fulvous with black area. Body length 3.4–4.5 mm. Aedeagus see Figs. 54, 55. – Malacca, Sumatra, Bali, possibly from Borneo..... ***A. semistriata*** L. Medvedev, 1999

– Elytra confusedly punctate, black, anterior margin and scutellum sometimes fulvous. Antennae serrate from the 4th segment on. – Male unknown..... **6**

6 Head red with partly darkened clypeus. Scutellum black. Metasternum black, abdomen fulvous with partly black basal segment. Body length 3.9–4.0 mm. – Borneo (Sabah)..... ***A. trusmadiensis*** **n. sp.**

– Head black with fulvous labrum. Scutellum fulvous. Underside fulvous with apex of abdomen and pygidium black. Body length 5.1–5.3 mm. – Borneo (Sabah)..... ***A. nigripennis*** **n. sp.**

7 Pronotum fulvous with transverse row of four black spots. Antennae distinctly serrate from the 5th segment on, with widely triangular 4th segment. – Head fulvous with black vertex, elytra fulvous with three bands and narrow margins black. Underside fulvous with black markings..... **8**

– Coloration of pronotum not as before. Antennae serrate from the 5th segment on, with very feebly triangular 4th segment..... **9**

8 Elytra with irregular rows of punctures. Labrum fulvous. Spermatheca as in Fig. 77. Body length of male 3.2–3.6 mm, of female 4.0–4.3 mm. – Borneo (Sabah). ..... ***A. maculicollis* n. sp.**

– Elytra confusedly punctate. Labrum black. Spermatheca as in Fig. 86. Body length of female 4.9 mm. – Borneo (Sabah). ..... ***A. similis* n. sp.**

9 Head metallic..... **10**

– Head black with fulvous labrum..... **12**

10 Elytra fulvous with humeral area (sometimes prolonged in an oblique stripe) and all margins black. – Pronotum fulvous with a dark metallic spot or sometimes with two spots. Body length 4.5–5.9 mm. Dorsal view see Fig. 20, aedeagus see Figs. 56, 57. See also couplet 4. – Borneo (Sabah). ..... ***A. takizawai*** L. Medvedev, 2013

– Elytra entirely or mostly metallic. **11**

11 Elytra entirely metallic blue or with small fulvous area near apex. Pronotum fulvous with central blue stripe. Body length 4.9–5.5 mm. – Clypeus and femora entirely black, underside of body entirely fulvous. Male unknown. – Borneo (Sabah). ..... ***A. kinabaluensis*** L. Medvedev, 2013

– Elytra dark bronze with large fulvous apical spot, deeply incised near suture. Pronotum dark bronze with fulvous lateral margins which are very narrow in male and broader in female. Body length of male 4.5 mm, of female 5.7–5.9 mm. – Borneo (Sabah)..... ***A. volkovi* n. sp.**

12 Pronotum black with narrow fulvous margins. Elytra black, sometimes with one or two poorly delimited fulvous spots (one transverse before middle, another before apex). Body length 4.5–4.7 mm. Female unknown. – Borneo (Sabah). .... ***A. obscura*** L. Medvedev, 2013

– Pronotum fulvous with black central stripe. Elytra fulvous with large humeral area, transverse band behind the middle, apex and all margins narrowly black. Body length 5.4–5.8 mm. Male unknown. – Borneo (Sabah). ..... ***A. collaris* n. sp.**

Clytra Laicharting, 1781

Only one species treated, *C. duodecimmaculata* (Fabricius, 1775): Body elongate ovate. Colour of upperside variable: pronotum from red fulvous to black; elytra red fulvous with basal, median and apical markings black, but markings sometimes strongly reduced. Legs black. Body length 11–12 mm. – Borneo, Myanmar, Indochina, South China, Sumatra, Java, Timor, Sumba.

Smaragdina Chevrolat, 1836

1 Body very narrow, elongate. Elytra with regular rows of punctures, more feeble at sides and on apical slope, 1.7 times (male) and 1.5 times (female) as long as wide. Body length of male 2.6–2.8 mm, of female 3.3–4.0 mm. – Frons as wide as eye. Body fulvous, with antennal segments 4–11 black; elytra with mostly darkened sides and apex (Fig. 32), sometimes also on basal part or with black apex; females with darkened scutellum, tibiae and tarsi. Aedeagus as in Figs. 65, 66. – Borneo (Sabah)..... ***S. linearis*** L. Medvedev & Kantner, 2002

– Body less narrow. Elytra without regular rows of punctures. Body length of male more than 3 mm, of female 3.4–5.1 mm. **2**

2 Eyes large. Frons narrow, 0.4–0.5 times as wide as eye in male, 0.65 times in female..... **3**

– Eyes of moderate size. Frons at least 0.8 times as wide as eye..... **4**

3 Eyes enormously large. Frons very narrow, 0.4 times as wide as eye. Dorsum fulvous, pronotum with two angulate spots; elytra with five spots (1, 2, 2; connected with the lateral stripes) and the extreme apex dark brown (Fig. 31). Aedeagus as in Figs. 63, 64. Body length 4.5–4.9 mm. – Borneo (Sabah, Kalimantan).... ***S. brunneonotata*** L. Medvedev, 1999

– Eyes moderately large. Frons less narrow, 0.5 times as wide as eye in male, 0.65 times in female. Body fulvous without any dark spots (Fig. 30). Aedeagus with three ridges beneath (Figs. 61, 62). Body length 4.0–4.5 mm. – Borneo (Sabah)... ***S. bakeri*** L. Medvedev, 1999

4 Head at least partly black..... **5**

– Head fulvous. – Pronotum entirely fulvous..... **8**

5 Head black, only labrum fulvous..... **6**

– Head fulvous with black vertex. – At least middle of pronotum black..... **7**

6 Pronotum black with side margins narrowly fulvous. Elytra fulvous, with humeral area, a band in the middle and narrow sides and suture black. Frons about twice as wide as eye. Aedeagus with triangular apex. Body length of male 4.1 mm. Female unknown. – Borneo (West Kalimantan, Sarawai)..... ***S. kalimantani*** L. Medvedev & Regalin, 1998

– Pronotum entirely fulvous or fulvous with darkened Y-marking on middle disk. Elytra fulvous with darkened sides and apex (Fig. 33). Frons of male 1.15 times as wide as eye. Aedeagus with apex narrowly truncate (Figs. 70–72). Body length 4.1–4.4 mm. – Borneo (Sabah). .... ***S. nigricapitis* n. sp.**

7 Frons of female 2.1 times as wide as eye. Pronotum black in the middle. Elytra black with fulvous stripe, widened in the middle and reduced in the basal third (Fig. 95). Spermatheca see Fig. 87. – Borneo (Sabah). ..... ***S.* sp.** [This species is possibly identical with *S. flavovariegata* L. Medvedev, 1999 from Sumatra and Malacca. Dorsal view of the holotype see Fig. 96, aedeagus see Figs. 90, 91. Body length of female 4.0 mm.]

– Frons narrower, 0.8 times as wide as eye in male, 1.1 times in female. Pronotum almost entirely black. Elytra black with fulvous spot before apex. Aedeagus with acutely triangular apex. – Body length 3.5–3.6 mm. – Borneo (Sabah, Sarawak)..... ***S. tristis*** L. Medvedev, 1999

8 Frons with three distinct grooves, wrinkled near the eyes, 1.15 times as wide as eye in male, 1.3 times in female. Scutellum black, elytra pale flavous with lateral margin and apex black (Fig. 35). – Aedeagus with triangular, very acute apex curved downwards, underside evenly convex (Figs. 67–69). – Borneo (Sabah, possibly also Kalimantan)..... ***S. trifoveata* n. sp.**

– Frons smooth without any grooves. Differently coloured... **9**

9 Elytra fulvous with well delimited black apex, sides and suture (Fig. 34). Frons about 1.5 times as wide as eye in male, 1.05 times in female. Aedeagus with elongate triangular apex, but apical tip not acute (Figs. 68–60). Body length 2.8–3.5 mm. – Underside with black breast and fulvous venter. Spermatheca as in Fig. 79. – Borneo (Sabah). ..... ***S. sabahensis*** L. Medvedev, 1999

– Elytra entirely fulvous (Fig. 29). Frons in both sexes about 1.75 times as wide as eye. Aedeagus with elongate and acutely triangular apex (see Medvedev 2013, fig. 10). Body length 3.4–4.0 mm. – Borneo (Sabah). ..... ***S. borneensis*** L. Medvedev, 2013

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Contribution on the study of *Eucera* Scopoli (Hymenoptera: Apidae) from Nakhchivan Autonomous Republic (Azerbaijan)

Khalid A. Aliyev & Mahir M. Maharramov

Abstract

In Nakhchivan Autonomous Republic (Azerbaijan) the bee genus *Eucera* Scopoli, 1770 has been found to comprise 12 species, four of which are new to the Azerbaijan fauna: *E. caspica* Morawitz, 1873, *E. excisa* Mocsary, 1879, *E. nigrilabris* Lepeletier, 1841, and *E. seminuda* Brullé, 1832. Distributional and biological data are presented for all species.

Keywords: *Eucera*, distribution, new records, feeding.

Zusammenfassung

Für die Autonome Republik Nachitschewan (Aserbaidschan) werden 12 Arten der Bienengattung *Eucera* Scopoli, 1770 nachgewiesen, darunter vier Arten neu für die Fauna Aserbaidschans: *E. caspica* Morawitz, 1873, *E. excisa* Mocsary, 1879, *E. nigrilabris* Lepeletier, 1841 und *E. seminuda* Brullé, 1832. Für alle Arten werden Daten zur Verbreitung und Biologie angegeben.

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1 Introduction

Nakhchivan Autonomous Republic is a landlocked exclave of Azerbaijan and situated in the south-western part of Transcaucasia. It is bordered by Armenia, Turkey and Iran. Natural borders are the northern Daralagez range, the eastern Zangezur range and the southern and south-western part of the Araz river. The lowest territory of the Republic, the Arazboyu plain (about 700 m above sea level), covers about one-third of the Republic, whereas the remaining two-thirds are located at altitudes between 1000 and 2000 m a. s. l. or higher.

The Arazboyu plain is about 150 km long and 25–30 km wide at its maximum width. It is characterised by cold and dry semi-desert climate. Minimum and maximum temperatures recorded in the plain are –32 °C and +43 °C respectively. The north-western, central and south-eastern parts of the Nakhichevan AR are situated in the mid mountain zone, which is very narrow in the North-West and wide in the centre of the Republic.

The low mountain zone (1200–1500 m) includes low mountains in the North-West and plains in the centre of the Republic. The mid mountain zone (1500–2400 m) covers the main part of the Republic and it is very wide between Shahbuz and Julfa districts. The narrow belt of the high mountain zone (2400–3906 m) covers the north-eastern, eastern and south-eastern parts of the Republic.

Nakhchivan AR is characterized by a rich flora. More than 2800 plant species are recorded here. The main ecosystems include semi-desert, mountains with xerophytic scrub, high mountain steppe, subalpine and alpine meadows.

The semi-desert zone covers the Arazboyu plain and foothills up to 1200 m spreading from North-West to South-East. The summer pastures of the zone are rich in wormwood (*Artemisia* sp.), camel thorn (*Alhagi* sp.), liquorice (*Glycyrrhiza glabra* L.) and ephemeral grasses.

The mountain zone with xerophytous scrub covers the territories situating at 1200–1500 m altitude.

The high mountain steppe is found from 2400 to 3900 m. Subalpine meadows are at the height of 2350–2900 m, and the alpine meadows are in humid territories at the height of 2900 m. Alpine meadows are well-developed in the Salvarti, Aghdaban, Kukudagh, Kecheldagh, Aghdagh and Gapichig mountains.

Only one species – *Eucera cineraria* Eversmann, 1852 has previously been recorded from Nakhchivan AR (Skhirtladze 1981).

Acknowledgements

The author received a grant (A/14/04729) from the German Academic Exchange Service (DAAD). Dr. E. Husenynov (Baku) improved the English language.

2 Material and methods

This report is based on a collection made by the senior author (Kh. A.) in May–June 1980 in the Ordubad district and in June 2003 in the Sharur district, and by the second author (M. M.) in June 2004–2007 in different parts of Nakhchivan AR. The samples were identified by Kh. A.

Identifications were made using the keys of Osytsnjuk et al (1978) and Schwarz et al. (1996), and by comparison with identified material from the collection of IZB. General comments on the distribution of species are based on the works of Özbek (1983), Skhirtladze (1981), Sitdikov & Pesenko (1988), and Proshalykin (2005). The subgeneric division of the genus follows Tkalců (1978, 1984) and Sitdikov & Pesenko (1988).

The collected material is deposited at the Institute of Zoology of Azerbaijan National Academy of Sciences, Baku (IZB) and the Institute of Biological Resources of Nakhchivan branch of Azerbaijan National Academy of Sciences, Nakhchivan (IBRN).

3 List of the *Eucera* species from Nakhchivan AR

Subgenus *Pteneucera* Tkalců, 1984

Eucera (Pteneucera) nigrifacies Lepeletier, 1841

Material: Ordubad, Tivi, 29.VI.2007, 3 ♀♀ (M. M.).

Biology: Feeds on *Astragalus ammophilus* Kar. et Kir.

Distribution: West of Southern Europe, Caucasus.

Remarks: Occurs in the mid mountain xerophytous landscape on dry slopes and in gardens. In the mountains it reaches up to 1500 m. New record for Nakhchivan AR.

Subgenus *Eucera* Scopoli, 1770

Eucera (Eucera) cineraria Eversmann, 1852

Material: Sharur, Akhura, 2.VI.2003, 3 ♂♂, 4 ♀♀ (Kh. A.); Djulfa, Goynjuk, 1.VI.2006, 2 ♀♀ (M. M.).

Biology: Feeds on *Melilotus wolgicus* Poir. and *Medicago sativa* Ledeb.

Distribution: East of Southern Europe, Asia Minor, Transcaucasia.

Remarks: Occurs in the mid mountain xerophytous landscape. Inhabits meadows and bushland. In the mountains it reaches up to 1600 m.

Eucera (Eucera) interrupta Baer, 1850

Material: Ordubad, Bilav, 26.V.1980, 4 ♂♂, 8 ♀♀ (Kh. A.).

Biology: Feeds on *Rosa canina* L., *Cotoneaster melanocarpus* Fisch. ex Blytt, and *C. integerrimus* Medik.

Distribution: Southern and Middle Europe, Caucasus, Middle Asia.

Remarks: Occurs in the lower mountain semi-desert landscape in gardens. In the mountains it reaches up to 1200 m. New record for Nakhchivan AR.

Eucera (Eucera) longicornis Linnaeus, 1758

Material: Ordubad, 26.V.1980, 8 ♂♂ (Kh. A.); Shakhbuz, Batabat, 2.VI.2004, 3 ♂♂ (M. M.); same locality, 21.VI.2007, 1 ♂, 3 ♀♀ (M. M.).

Biology: Feeds on *Cerasus araxina* Pojark. and *Onobrychis cornuta* (L.) Desv.

Distribution: Europe (except for Far North), Transcaucasia.

Remarks: Occurs in the lower mountain semi-desert and mid mountain phryganoid landscape. Inhabits forest borders and slopes with xerophytous vegetation. In the mountains it reaches up to 1200 m. New record for Nakhchivan AR.

Eucera (Eucera) nigrilabris Lepeletier, 1841

Material: Ordubad, 25.V.1933, 1 ♂ (A. Bogachev); Ordubad, Nyusnyus, 2000 m, 26.V.1980, 4 ♂♂ (Kh. A.).

Biology: Feeds on *Taraxacum tenuisectum* Somm. et Levier.

Distribution: Southern Europe, Transcaucasia.

Remarks: Occurs in lower mountain semi-desert and mid mountain phryganoid landscape. Inhabits border fields, xerophytous slopes and gardens. In the mountains it reaches up to 1500 m. New record for Azerbaijan.

Eucera (Eucera) nitidiventris Mocsary, 1879

Material: Djulfa, Goynyuk, 1.VI.2006, 3 ♀♀ (M. M.).

Biology: Feeds on *Crataegus meyeri* Pojark. and *Achillea nobilis* L.

Distribution: West of Southern Europe, Caucasus.

Remarks: Occurs in the mid mountain xerophytous landscape. Inhabits stone slopes. In the mountains it reaches up to 1600 m. New record for Nakhchivan AR.

Subgenus *Pareucera* Tkalců, 1978

Eucera (Pareucera) caspica Morawitz, 1873

Material: Shakhbuz, Batabat, 2.VI.2004, 3 ♂♂, 2 ♀♀ (M. M.).

Biology: Feeds on *Thymus sipyleus* Boiss.

Distribution: Southern Europe (except for South-West), Caucasus.

Remarks: Occurs in the mid mountain xerophytous landscape. Inhabits borders of sparse forests and near bushes. In the mountains it reaches up to 2000 m. New record for Azerbaijan.

Subgenus *Agatheucera* Sitdikov et Pesenko, 1988

Eucera (Agatheucera) vittulata Noskievicz, 1934

Material: Shakhbuz, Batabat, 2.VI.2004, 5 ♂♂ (M. M.).

Biology: Feeds on *Nepeta cataria* L. and *Ononis spinosa hircina* (Jacq.) Gams.

Distribution: Europe, Caucasus.

Remarks: Occurs in the mid mountain steppe. Inhabits meadows, near lakes and bushlands. In the mountains it reaches up to 2000 m. New record for Nakhchivan AR.

Subgenus *Rhyteucera* Sitdikov et Pesenko, 1988

Eucera (Rhyteucera) vulpes Brullé, 1832

Material: Sharur, Akhura, 2.VI.2003, 2♂♂, 3♀♀ (Kh. A.).

Biology: Feeds on *Lotus corniculatus* L., *Trifolium pratense* L., and *Melilotus albus* Medik.

Distribution: Europe, Caucasus.

Remarks: Occurs in lower mountain semi-desert landscape. Inhabits fields. In the mountains it reaches up to 1300 m. New record for Nakhchivan AR.

Subgenus *Atopeucera* Tkalců, 1984

Eucera (Atopeucera) excisa Mocsary, 1879

Material: Ordubad, Agdara, 18.VI.1980, 3♂♂ (Kh. A.).

Biology: Feeds on *Trifolium canescens* Willd.

Distribution: Middle Europe, Caucasus.

Remarks: Occurs in high mountain meadows and meadow-steppe landscape. Inhabits grassy slopes and mountain meadows. In the mountains it reaches up to 2600 m. New record for Azerbaijan.

Eucera (Atopeucera) seminuda Brullé, 1832

Material: Djulfa, Darydag, 1200 m, 3.VI.2007, 1♂, 2♀♀ (M. M.).

Biology: Feeds on *Pyrus salicifolia* Pall., *Cerasus vulgaris* Mill., and *Thymus sipyleus* Boiss.

Distribution: South Europe, Caucasus.

Remarks: Occurs in lower mountain semi-desert landscape. Inhabits dry slopes, stony areas. In the mountains it reaches up to 1200 m. New record for Azerbaijan.

Subgenus *Stibeucera* Tkalců, 1978

Eucera (Stibucera) clypeata Erichson, 1835

Material: Nakhchivan, 950 m, 14.VI.2007, 5♂♂ (M. M.); Shakhbuz, Batabat, 2.VI.2004, 2♀♀ (M. M.); same locality, 21.VI.2007, 4♀♀ (M. M.); Djulfa, Goynjuk, 1.VI.2006, 2♀♀ (M. M.).

Biology: Feeds on *Melilotus albus* Medik., *Potentilla argentea* L., and *Astragalus fragrans* Willd.

Distribution: South Europe, Caucasus, Middle Asia, Kazakhstan.

Remarks: Occurs in lower mountain semi-desert and in the mid mountain xerophytous landscape. Inhabits grassy slopes, meadows near lakes, border of sparse forest and bushes, gardens and steppe areas. In the mountains it reaches up to 2000 m. New record for Nakhchivan AR.

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Revision of the Western Palaearctic species of the *Andrena taraxaci*-group with description of four new species (Hymenoptera: Andrenidae)

Hans Richard Schwenninger

Abstract

The Western Palaearctic species belonging to the group of *Andrena taraxaci* Giraud (subgenus *Chlorandrena* Pérez 1890) are revised, and 16 valid species are recognized. Four species new to science are described: *Andrena (Chlorandrena) jerbaensis* **n. sp.** and *Andrena (Chlorandrena) flavomarginata* **n. sp.** from Tunisia, *Andrena (Chlorandrena) maculicornis* **n. sp.** from Tunisia, Libya and Egypt, and *Andrena (Chlorandrena) crepidis* **n. sp.** endemic to Cyprus. The hitherto unknown female of *Andrena pseudotaraxaci* Scheuchl 2010 is defined. Two species are new to the bee fauna of Europe: *Andrena curtivalvis* Morice 1899 from Spain and *A. crepidis* n. sp. from Cyprus. Identification keys for the Western Palaearctic species of the *Andrena taraxaci*-group are provided. The geographical distribution of the newly described species is illustrated in a map.

Keywords: *Andrena*, *Chlorandrena*, Cyprus, Egypt, Libya, Russia, Spain, Tunisia, new records, identification key, distribution.

Zusammenfassung

Die westpaläarktischen Arten der *Andrena taraxaci*-Gruppe der Untergattung *Chlorandrena* Pérez 1890 werden revidiert. Vier neue Arten werden beschrieben: *Andrena (Chlorandrena) jerbaensis* **n. sp.**, *Andrena (Chlorandrena) flavomarginata* **n. sp.**, beide aus Tunesien, *Andrena (Chlorandrena) maculicornis* **n. sp.** aus Tunesien, Libyen und Ägypten sowie *Andrena (Chlorandrena) crepidis* **n. sp.** aus Zypern. Hiermit sind 16 Arten aus der Westpaläarktis bekannt. Das bisher unbekannte Weibchen von *Andrena pseudotaraxaci* Scheuchl 2010 wird beschrieben. Außerdem werden zwei Erstnachweise für Europa dokumentiert: *Andrena curtivalvis* Morice 1899 aus Südspanien und *A. crepidis* n. sp. aus Zypern. Bestimmungsschlüssel für die westpaläarktischen Arten der *Andrena taraxaci*-Gruppe werden erstellt. Die derzeit bekannte geographische Verbreitung der neu beschriebenen Arten ist in einer Karte dargestellt.

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1 Introduction

In spring the flowers of Dandelion (*Taraxacum officinale* agg.) and other yellow composites are visited by solitary bees. Among them specimens of the genus *Andrena* Fabricius 1775 are most frequently. In the Palaearctic region the genus *Andrena* consists of about 950 species (Gusenleitner & Schwarz 2002, Gusenleitner et al. 2005), which can be spread across 68 subgenera (Gusenleitner & Schwarz 2002, Schmid-Egger 2005, Michener 2007). The subgenus *Chlorandrena* was defined by Pérez (1890), and *Andrena humilis* Imhoff 1832 was designed as its type species. This subgenus is confirmed by phylogenetic analyses (Dubitzky 2005). Nearly all species of the subgenus *Chlorandrena* are visiting yellow composites in spring. Some of them are known as oligolectic (Westrich 1990, Schwenninger 2001).

To date, the well-defined *A. taraxaci*-group in the Western Palaearctic consisted of 12 species (Gusenleitner & Schwarz 2002, Schwenninger 2007, Scheuchl 2010), whereas in the Eastern Palaearctic only one subspecies, *Andrena taraxaci orienticola* Strand 1915 from the Far East, is known (Xu & Tadauchi 2002).

In this study all Western Palaearctic species of the *Andrena taraxaci*-group are revised, and keys for their identification are provided. The investigated material yielded not only a number of new records of zoogeographic interest, but also four new species which are described in section 4.

Acknowledgements

I am indebted to the following persons for the loan of material: Felix Amiet (Solothurn, Switzerland), Hannes Baur (Natural History Museum Berne, Switzerland), Ronald Burger (Haßloch, Germany), Olaf Diestelhorst (Düsseldorf, Germany), Mike Herrmann (Konstanz, Germany), Till Osten † and Lars Krogmann (Stuttgart State Museum of Natural History, Germany), Erwin Scheuchl (Ergolding, Germany), Stefan Schmidt and Johannes Schuberth (ZSM), Andreas Taeger (Senckenberg German Entomological Institute, Müncheberg, Germany), Nicolas Vereecken (Bruxelles, Belgium), Claire Villemant and Agnièle Touret-Alby (MNHN).

In particular, I want to thank Fritz Gusenleitner, Upper Austrian State Museum Linz (Austria) for a long term loan of the *Chlorandrena*-material of the Warncke-collection and also for given information about a hitherto undescribed taxon of Warncke. Furthermore, I am grateful to Maximilian Schwarz (Ansfelden, Austria) for generously lending comprehensive material especially from Central Asia. Theodora Korniotou (Administrator of Cyprus Museum of National History, Nicosia) and Eleftherios Hadjisterkotis (Ministry of the Interior, Nicosia, Cyprus) assisted in finding the collection of George A. Mavromoustakis †. The staff of the Agricultural Research Institute, Nicosia (Cyprus) enabled to check the collection of Mavromoustakis. Rainer Prosi (Crailsheim, Germany) helped with mapping of the records with Quantum GIS. Furthermore, I am indebted to Julian Fricke (Karlsruhe, Germany) for his assistance in making macro photos, for testing the identification keys and for the advice to use the marginal area of the propodeum as a distinguishing feature. Anselm Kratochwil (Osnabrück, Germany) and Erwin Scheuchl kindly read the manuscript and provided valuable improvements. Finally, I thank my wife Karin Wolf-Schwenninger for critically reading the manuscript.

For the field trips in spring 2014, a collecting permit was issued to the author by the government of Andalucía (Ref. SGYB/AF/DBP Re-98/14; February 27, 2014).

2 Material and methods

In this study 379 specimens of the *Andrena taraxaci*-group were examined. Except of *Andrena curtivalvis* Morice 1899, *A. stabiana* Morice 1899, *A taraxaci* Giraud 1861 and *A. turanica* Osytshnjuk 1993, the type material of the taxa could be studied. Specimens of *Andrena curtivalvis*, *A. stabiana* and *A. taraxaci*, which are deposited in OLML, and which have been identified by Warncke, were used for comparison provided that their characters match the original species descriptions. In these cases the author follows the opinion of Warncke. As to *Andrena turanica*, the original description of Osytshnjuk (1993) and the identification key of Osytshnjuk et al. (2005) were used for comparison. With the exception of *Andrena curtivalvis* these taxa are accepted by Gusenleitner & Schwarz (2002). The validity of *Andrena curtivalvis* Morice 1899 has been confirmed by Schwenninger (2007).

Erwin Scheuchl called the author's attention to an unidentified male of *Chlorandrena* from the North Caucasus (Russia) in OLML. After preparation of the genitalia by the author the identification of this worn out, hardly determinable specimen was enabled.

Additional material was found in various collections (see Acknowledgements), forwarded and provided to the author for identification and study. A particularly diverse and comprehensive contribution came from Maximilian Schwarz, who had accumulated material from Middle Asia (Turkmenistan and Kirgizstan), collected by Halada and Denes during a series of field trips to various regions since the 1990s.

The morphological studies were carried out with a stereo microscope SZX16 (Olympus). All measurements were done using a micrometre eyepiece of the SZX16. For the photographs the digital camera DP71 (Olympus) was used. The objects were focused down by 15 to 140 steps beginning at the top. For each focus step a photo was taken. The single shootings were stacked and the montage was done using the freeware CombineZM of Alan Hadley in the version of April 26. 2008.

Males of the *A. taraxaci*-group are easily differentiated by comparing the shapes of sternum 8 (Schwenninger 2007). Since the usually very dense pubescence of the dorsal side of sternum 8 makes the shape not clearly visible, the predominantly bare ventral side of sternum 8 should be used for identification. This implicates the total extraction of sternum 8. Therefore, and for preparation of other body parts, the specimens were soaked in a relaxing chamber (plastic box). This box was provided with wet pulp drenched with water, and the specimens were kept therein for about one day. The dissection was done with fine tweezers (Dumont No. 5) and the genitalia were glued with methylcellulose on pads of white Bristol-cardboard. The pads are pinned under the corresponding specimens.

Each studied specimen was labelled with a unique identification number and letter sequence (= ID-No.) which is also recorded in the database "Entomon" (developed by Rainer Prosi, Crailsheim, Germany, see also www.wildbienen-kataster.de). Each data record includes, as far as available, information about locality, geographic coordinates, date, collector, collection (= depository), and identifier. Observations of the visited plant species, nesting sites and nesting activities are also registered, if available.

The distribution maps were created using QGIS version 2.4.0. As base map the open data "OpenStreetMap" was used, licensed under the Open Data Commons Open Database License (ODbL) (see www.openstretmap.org/copyright).

Acronyms of depositories

MNHN	Muséum National d'Histoire Naturelle, Paris, France
OLML	Upper Austrian State Museum Linz, Austria
OLMW	Upper Austrian State Museum Linz, Austria (collection Klaus Warncke †)
Scer	Collection Erwin Scheuchl, Ergolding, Germany
Scwe	Author's collection (testamentary promised to be deposited in SMNS)
Scwz	Collection Maximilian Schwarz, Ansfelden, Austria
ZSM	Bavarian State Collection of Zoology, Munich, Germany

Abbreviations

Morphological terms and abbreviatons used in this paper mainly follow Michener (1944, 2007).

BL	body length (from antennal base to tip of pygidial plate)
coll.	collection
FL	flagellomere(s)

HL	head length, from top of vertex to lower margin of clypeus excluding process of labrum
HW	head width
L, W	maximum length, respectively width
leg.	legit
N, E, W	latitude respectively longitude
Pd	puncture diameter
S	metasomal sternum
T	metasomal tergum
WL	length of forewing including tegula

3 Diagnostic characteristics of the subgenus *Chlorandrena*

Within the genus *Andrena* the subgenus *Chlorandrena* Pérez 1890 is characterized by distinct, deeply impressed punctures on the meso- and metasoma. The depression of the punctures is encircled by a beaded rim, resembling an impact crater. For this type of punctures the term 'crater punctures' is used in the present paper.

The females have a row of spines on the back side of the hind femur and plumose (strongly branched) hairs on the corbiculae. The facial foveae are long, but not square, extending about as half as long as the compound eyes. The lobes of the gonocoxites are well developed and the gonostyli are shovel-shaped or spatulate. Sternum 8 is densely pubescent and sometimes shows lateral extensions. The species of the subgenus *Chlorandrena* are heterogeneous and differ in both sexes in several traits. WARNCKE (1968) divided this subgenus in three parts: the *humilis*-, *taraxaci*- and *livens*-group (named after the most characteristic species). Especially, the typical shape of the male genitalia and of sternum 8 allows a proper division of these groups. The shape of the facial foveae is the main tool to separate the females of the different taxa-groups within the subgenus *Chlorandrena*. The females of the *Andrena taraxaci*-group are characterized by long facial foveae, which are narrowed near the antennal fossae ('comma-shape'). In males sternum 8 shows conspicuous tooth-like dilatations, and the shovel-like excavations of the gonostyli are faintly developed.

Only a few species within the subgenus *Chlorandrena* do not fit into this diagnostic pattern. *Andrena shteinbergi* Osytshnjuk 1993 is one of these exceptions. The females have comma-shaped facial foveae, but the terga are polished and without typical crater punctures. The males have small shovel like gonostyli and no lateral dilatations on sternum 8 (GUSENLEITNER & SCHWARZ 2002). Another species with inconsistent characters is *Andrena panurgimorpha* Mavromoustakis 1956. Males have tooth-like rounded lateral dilatations on sternum 8 but their gonostyli are broad shovel-like. This character and the oval facial foveae of the females indicate that this taxon belongs to the *A. humilis*-group.

4 Descriptions of new species

Andrena (Chlorandrena) jerbaensis n. sp.
(Figs. 5, 20, 37)

Holotype (♀): Tunisia: Governorate de Médenine, Jerba, El May, El Ghriba, E10.9 N33.8, 6.III.2008, leg. SCHWENNINGER (Scwe, ID-No. 0901031scwe075).

Paratypes: Tunisia: Governorate de Médenine: Jerba N, 19.II.1992, 1 ♀; Jerba S, 14.II.1992, 2 ♀♀; Jerba W, 23.II.1992, 1 ♂; all leg. WARNCKE (OLMW); Jerba, El May, El Ghriba, E10.9 N33.8, 6.III.2008, 2 ♀♀; Midoun Mezraia, E11.0 N33.8, 7.III.2008, 2 ♀♀; all leg. SCHWENNINGER (Scwe); Governorate Tatouine: 30 km S Zarzis [also transliterated as Jarjis], 16.II.1992, 1 ♂, leg. WARNCKE (ZSM); 16.II.1992, 1 ♀, 17.II.1992, 1 ♀, 24.II.1992, 1 ♂; all leg. WARNCKE (OLMW); 20 km S Zarzis, 26.II.1992, 2 ♂♂, 1 ♀; 10 km N Foum Tataouine, 15.II.1992, 1 ♂, 21.II.1992, 2 ♂♂, 25.II.1992, 2 ♀♀; all leg. WARNCKE (OLMW).

Etymology

The species name refers to the type locality Jerba [also transliterated as Djerba], the largest island of North Africa (514 km²), located in the Gulf of Gabes, Tunisia. The native name is Girba [also transliterated as Jerba or Jarbah]. WARNCKE had determined several specimens of this new taxon as *Andrena taraxaci djerbaensis*, but never described this subspecies. To avoid confusion with specimens determined by WARNCKE, which may exist in hitherto unexamined collections, the diction '*jerbaensis*' is used for the species name.

Description

Female (holotype, BL = 10.0 mm)

Colouration: Integument black, except inner margin of mandible, lower side of FL5–10 reddish yellow; apical depressions of terga 1–6 brightened reddish brown towards the hind margin, depressions of sterna 2–5 reddish yellow; apex of metatarsus 3 reddish yellow, the other tarsomeres increasingly brightened, inclusive claws reddish yellow, also the tibial spurs; wing membrane hyaline, yellowish obfuscated, veins and pterostigma reddish yellow, radial vein reddish brown; tegulae transparent reddish yellow.

Pubescence: Hairs reddish yellow, especially caudal fimbria, scopa and hind legs except posterior margin of metasomal terga 3 and 4 with rows of whitish hairs; facial fovea with yellow to dark yellow pubescence; on scopa hairs heavily plumose, longer than length of the hind spur.

Head: transverse, HL = 2.3 mm, HW = 3.0 mm, HL/HW = 0.8. – Facial foveae: distance between fovea and lateral ocellus (130 µm) smaller than width of ocellus (170 µm), fovea dorsally occupying about three-quarters of the distance between compound eye and lateral ocellus (see Fig. 37). – Frons and paraocular area with longitudinal rugulae, looking like longitudinal stripes, interrugal space smooth and shiny. – Malar space: linear. – Genal area: about as wide as compound eye. – Antennae: first flagellomere

(420 µm) shorter than FL2–4 (465 µm); FL2–9 transverse, towards the apex continuously longer (FL2: W = 160 µm, L = 200 µm, FL9: W = 240 µm, L = 200 µm), FL10 longer than wide. – Clypeus: slightly convex, with coarse punctures, interpunctural spaces about 1 Pd, towards the apex punctures increasingly transverse; interpunctural spaces weakly shagreened. – Labrum: process trapezoid, moderately emarginate, about ⅔ as wide as labrum, shiny.

M e s o s o m a : Pronotum: without humeral angle, surface shagreened. – Scutum: anterior part strongly shagreened, surface dull, posterior part weakly shagreened and more shiny; punctuation shallow and dense (interspaces 1–2 Pd). – Scutellum: shiny with very fine shagreen, punctuation fine and distinct, punctures deeply impressed, dense on the margins (interspaces < ½ Pd), scattered on the disc (interspaces 2–3 Pd). – Propodeum: propodeal enclosure indicated by a fine boundary line, anterior margin with wrinkles, coarsely shagreened; lateral area of propodeum rugose with coarse punctuation (crater punctures), interspaces 1–2 Pd; marginal area transversely shagreened on the median part, without pubescence or punctures (like Fig. 48), in contrast, the curved hind margin with pubescence. – Mesopleurae: shagreened, dense, rugose punctuation (crater punctures, with interspaces < ½ Pd). – Wing: nervulus strongly postfurcal, distance from basal vein usually 2–3 times the width of nervulus. – Legs: Hind femur with a row of 10 dark brown spines (this character varies, other females of this taxon have rows of 12–14 spines), tarsal claws all bidentate.

M e t a s o m a : Terga: with fine shagreen, density of punctuation from T1 to T4 increasing (interspaces on disc of T1 > 2 Pd, T4 < 2 Pd), in contrast, the impressions of the punctuation decreasing, on T1 the crater punctures projecting from the surface, on the other terga more shallow; depression distinct, especially on T3 and T4. – Sterna: weakly shagreened, moderately shiny, discs with fine punctures (interspaces 2–4 Pd), punctuation on posterior margin denser (interspaces < 1 Pd). – Pygidium: pygidial plate U-shaped, without raised triangular area or carina.

Male (paratype, ID-No. 070915scwe005, BL = 9 mm, WL = 7 mm)

C o l o u r a t i o n : Integument black, except lower side of FL4–11 (yellowish-reddish brown) and mandible teeth (reddish brown); depressions of terga 1–6 brightened reddish brown, hind margins yellowish brown; depressions of sterna reddish yellow; tibiae and basitarsi reddish brown, tarsomeres increasingly brightened, reddish yellow; tibial spurs yellowish; wing membrane hyaline, yellowish obfuscated, veins and pterostigma reddish yellow, except radial vein (reddish brown); tegulae reddish brown, transparent.

P u b e s c e n c e : Hairs reddish yellow; clypeus, genal area, mesepisternum, coxa and femura with white hairs; pubescence on head, meso- and metasoma long, moderately dense, on frons and clypeus very dense; hairs on clypeus shorter (400–500 µm), on the genal area and mesepisternum very long (1000–1100 µm) and conspicuous; on mesosoma and terga 600–700 µm long, on terga 2–5 slightly shorter (400–500 µm); margins of sterna 2–5 with slightly protruding fimbriae (hairs about 500 µm long).

H e a d : transverse, HL = 2.7 mm, HW = 2.2 mm, HL/HW = 0.8. – Frons: Face above antennal fossae with longitudinal rugulae, interrugal space with coarse punctures. – Malar space: linear. – Genal area: width 580 µm, broader than width of compound eye (550 µm). – Clypeus: slightly convex, punctures transverse, imbricative, dense (interspaces ½–1 Pd); surface shiny and smooth. – Labrum: process emarginate, shiny.

M e s o s o m a : Pronotum: without humeral angle, surface weakly shagreened, mostly shiny, with scattered punctures. – Scutum: anterior part shagreened, surface dull, punctuation dense (interspaces 1 Pd), posterior part weakly shagreened and more shiny (like in female), punctuation more scattered (interspaces 2 Pd). – Scutellum: weakly shagreened, more shiny, punctuation in contrast to scutum deeper; density of punctuation towards the posterior part increasing (interspaces anterior part 1 Pd, posterior part ½ Pd). – Propodeum: propodeal enclosure indicated by a very fine boundary line, basally with fine wrinkles; lateral area of propodeum rugose with crater punctures, interspaces 1–2 Pd.; rest as in female.

M e t a s o m a : Terga: mostly shiny, only weakly shagreened, T1 with distinct crater punctures, interspaces up to 2 Pd, punctuation of T2–T4 more shallow and increasingly denser (interspaces until 1 Pd). – Sterna: weakly shagreened, moderately shiny, anterior part without punctures, towards the posterior margin punctuation denser (interspaces < 1 Pd), posterior margin of S6 arched, vertically protruding, in the middle weakly emarginate. – Genitalia: apex of gonostyli broad, not acute (Fig. 5); process of sternum 8 with emarginate apex, width posterior to lateral teeth smaller than anteriorly (Fig. 20).

Diagnosis

Andrena jerbaensis is probably closely related to *Andrena stabiana*. The females of both taxa differ in the colouration of the pubescence of the head. *A. jerbaensis* has no dark hairs whereas *A. stabiana* is predominantly dark brown haired. Dorsally, the facial fovea is broader in *A. jerbaensis*. Thus the minimum distance to the lateral ocellus is distinctly smaller than the diameter of the lateral ocellus (see Fig. 32). In *A. stabiana* this distance is at least as wide as the diameter of the ocellus. The male genitalia differ in the shape of the gonostyli. The apex of the gonostylus of *A. jerbaensis* is much broader (see Figs. 5–6). The process of sternum 8 posterior to its lateral teeth is narrower than anteriorly (Fig. 20). In *A. stabiana*, the pro-

cess posterior to its lateral teeth is much broader than anteriorly (see Fig. 21). For further characteristics see the keys (section 6).

Remark

When studying the *Andrena*-collection of KLAUS WARNCKE in OLML, the author detected specimens with type labels assigned to *Andrena taraxaci djerbaensis*. Neither the publications of WARNCKE nor the worldwide checklist of the genus *Andrena* (GUSENLEITNER & SCHWARZ 2002) refer to this taxon. On enquiry, the curator of the collection in OLML, FRITZ GUSENLEITNER, explained that WARNCKE did not succeed in describing this taxon before his sudden death. To get more information about this taxon the author undertook two field trips to Tunisia. The south of Tunisia, especially the island of Jerba, was visited in spring 2008, the northern part of Tunisia in March 2010.

Observation of flower visits

Females of *A. jerbaensis* with pollen loads were collected by the author on flowers of *Reichardia picroides* (L.). Like the other species of the *A. taraxaci*-group *A. jerbaensis* is supposed to prefer yellow composites.

Andrena (Chlorandrena) crepidis **n. sp.**
(Figs. 11, 16, 38)

H o l o t y p e (♂): Cyprus: Limassol District, 4 km SW Kaminaria, 24.III.2013, leg. SCHWENNINGER (Scwe, ID-No. 121107scwe105).

P a r a t y p e s: Cyprus: Limassol District, 4 km SW Kaminaria, 24.III.2013, 1 ♂, 1 ♀; Kaminaria, Paphos Mountains, 2.IV.2009, 1 ♂, 22.III.2013, 1 ♂, 24.III.2013, 1 ♂, all specimens leg. SCHWENNINGER (Scwe); 2.IV.2009, 1 ♂, leg. SCHWENNINGER (OLML); Limassol Ayia Phyla (Agia Fyla), 11.III.1939, 1 ♂, leg. MAVROMOUSTAKIS (OLMW).

Etymology

The name *crepidis* refers to the preferred pollen source at the type location in the Troodos Mountains, *Crepis reuteriana* Boiss. & Heldr.

Description

Male (holotype, BL = 7 mm, WL = 6 mm)

C o l o u r a t i o n: Integument black except as follows: mandible at the apex (both teeth) reddish, depressions of terga towards hind margin brightened from reddish brown to reddish yellow; depressions of sterna reddish yellow; claws and tibial spurs reddish yellow; wing membrane hyaline, brownish obfuscated, veins brown, pterostigma reddish brown; tegulae reddish brown.

P u b e s c e n c e: Hairs all over reddish yellow; especially head, mesopleurae, scutellum, propodeum, tergum 1 and femur with extremely long hairs, approximately as long as the inner spurs of the hind tibia (650 µm), terga with long scattered hairs only on the disc of T1; on the disc of T2–T5 hairs much shorter, about 200 µm, depressions medially with very short hairs forming a narrow band which extends on the sides of the tergum; sterna 2–6 with oblique, erect subapical fimbriae (hairs: 300–370 µm).

H e a d: transverse, HL = 2.0 mm, HW = 2.5 mm, HL/HW = 0.8. – Vertex: behind lateral ocelli wider (190 µm) than diameter of the lateral ocelli (160 µm). – Frons: face above antennal fossae with longitudinal rugulae, interrugal space smooth and shiny. – Malar space: linear. – Genal area: about as wide as compound eye. – Antennae: first flagellomere (360 µm) shorter than FL2–4 (420 µm), but longer than FL2–3 (275 µm); FL2 and FL3 very short, flagellomeres longer towards the apex (FL5: W = 200 µm, L = 180 µm; FL7: W = 205 µm, L = 200 µm), beginning with FL8 longer than wide (FL8: W = 197 µm, L = 205 µm); FL10 distinctly longer than wide (W = 182 µm, L = 255 µm). – Clypeus: shagreened, coarsely punctuated, punctures transverse. – Labrum: process almost as wide as labrum, emarginate, smooth and shiny. – Galea: shagreened, maxillary palpi longer than galea, the last two segments protruding beyond apex of galea.

M e s o s o m a: Pronotum: without humeral angle, densely shagreened. – Scutum: strongly shagreened, more or less dull, except the posterior third where the integument is weakly shagreened and more shiny, punctuation deeply impressed, on the anterior part rather dense (interspaces 1 Pd), towards the scutellum decreasing, more scattered, interspaces sometimes > 3 Pd. – Scutellum: weakly shagreened, shiny, punctuation dense, interspaces on anterior part 1 Pd, interspaces on posterior part towards the hind margin > ½ Pd. – Propodeum: propodeal triangle (enclosure) well defined by a boundary line, shagreened, on basal zone with very fine wrinkles; lateral area of propodeum rugose, with crater-like punctures, interspaces 1–2 Pd; marginal area on the median part transversely striated, without dense pubescence also on the curved hind margin. – Mesopleurae: shagreened, anterior part with dense punctuation (crater punctures, interspaces ½–1 Pd), towards the posterior margin punctuation shallow and scattered (interspaces 2–4 Pd). – Wing: nervulus strongly postfurcal, distance from basal vein usually at least 4 times the width of the nervulus. – Legs: tarsal claws all bidentate.

M e t a s o m a: Terga: shiny, only weakly shagreened, especially disc of T1 with smooth parts; T1 with crater punctures, on T2–T5 punctures increasingly finer, punctuation scattered, interspaces 2–3 Pd; depressions of terga distinctly separated from the discs, shiny with weak shagreen and very fine scattered punctuation, density of punctuation decreasing posteriorly (3–5 Pd), punctures on T5 more or less extinct. – Sterna: in contrast to terga distinctly shagreened, punctuation scattered as on terga,

interspaces 2 Pd; hind margin of S6 curved, in the middle with weak emargination. – Genitalia: very small in comparison to other species of the *Andrena taraxaci*-group (length = 150 µm, see Fig. 11); process of sternum 8 bar-shaped, posterior and anterior to the lateral teeth with the same width (see Fig. 26).

Female (paratype, ID-No. 090102scwe398, BL = 8 mm, WL = 7 mm)

Colouration and pubescence: Mainly as in male, but lower side of flagellomeres 5–10 reddish brown; facial foveae bright yellow; caudal fimbria, hind legs, especially scopa, with plumose reddish yellow pubescence, hairs on scopa longer than length of the hind spur; hind margin of tergal depressions 2–4 with yellowish white hair bands, covering approximately the posterior third of the depressions. Hair bands on T2 broadly interrupted, on T3 reduced in the middle, on T4 complete; S2–5 with rows of erect reddish yellow hairs.

Head: transverse, HL = 2.0 mm, HW = 2.7 mm, HL/HW = 0.7. – Vertex: behind lateral ocelli smaller (145 µm) than diameter of the lateral ocelli (155 µm). – Frons: face above antennal fossae with longitudinal rugulae, interspaces with very fine punctuation. – Facial foveae: comma-shaped, distance between fovea and lateral ocellus (145 µm) smaller than width of ocellus (160 µm), fovea dorsally occupying more than ⅔ of the distance between compound eye and lateral ocellus. – Clypeus: with transverse punctuation. – Antennae: first flagellomere almost as long as FL2–4; FL2–5 very short, transverse, FL6–8 square, FL9–10 longer than wide.

Mesosoma: Pronotum and scutellum: as in male except propodeum. – Propodeum: more shiny as in male, only weakly shagreened; lateral areas of propodeum near apex of the triangle with a zone of weak punctuation, on the lateral declivous area punctuation more distinct, dense and coarse (crater punctures, interspaces 2 Pd); marginal area of propodeum transversely shagreened, without pubescence, curved hind margin posteriorly with extreme fine pubescence (only visible at high magnification). – Legs: hind femur with a row of 16 reddish brown to dark brown spines.

Metasoma: Terga: more dull than in male, intensively shagreened, especially disc of T1 densely shagreened with scattered crater punctures (interspaces 3–5 Pd); T2–T5 with much finer punctures, scattered as T1. – Sterna: S2–5 with dense punctuation, interspaces < 1 Pd, sculptured as in terga, however, punctuation more distinct.

Diagnosis

A. crepidis is the smallest representative of the *A. taraxaci*-group and has the shortest genitalia (length = 1.5 mm, see Fig. 11). The process of sternum 8 is similar to a small *A. taraxaci*, but in contrast to *A. taraxaci* the process is bar-shaped and parallel-sided. For further characteristics see the keys (section 6).

Observation of flower visits

Flower visits were observed by the author on *Crepis reuteriana* Boiss. & Heldr. and *Leontodon tuberosus* (L.) (Asteraceae, Cichorieae). Like the other species of the *A. taraxaci*-group, *A. crepidis* is supposed to prefer yellow composites.

Andrena (Chlorandrena) maculicornis **n. sp.**

(Figs. 12, 27, 36, 39, 40)

Holotype (♀): Tunisia: Gafsa 21.III.1976, leg. U. Lanham, P. Robinson & B. Soluonias (OLML, ID-No. 060112scwe152).

Paratypes: Libya: Cyrenaica, Ain Mara R. U. Agrario [= Royal Agriculture Office], IV.1926, 2 ♀♀, leg. Krüger (Scwe), 1 ♀, leg. Krüger (Scer), 1 ♀, leg. Krüger (OLMW). – Egypt: Omria, Min. Agr. Egypt, 24.II.1918, 1 ♂ ex coll. Storey; Mariout, Dep. Agr. Egy., 07.III.1912, 1 ♀. – Tunisia: 1 ♀ without specification of date, locality or collector (all specimens OLMW).

Etymology

The species name *maculicornis* is a composition of the Latin terms maculatus (= spotted or stained) and cornus (= horn) and refers to the typical feature of this taxon, the dark base of the flagellomeres, which look like spots on the yellow reddish brown antenna.

Description

Female (holotype, BL = 9.5 mm)

Colouration: Antennae mostly reddish yellow; scape, pedicel and FL1–3 reddish brown, lower side of FL4–10 reddish yellow, upper side also reddish yellow, but base of the flagellomeres reddish brown, visible as dark spots (Fig. 39); integument of head and mesosoma black, terga brown, depressions of the terga reddish brown; femur and tibiae reddish brown, tarsi posteriorly brightened, reddish yellow, spurs of tibiae yellow; tegulae pale yellow; wing membrane hyaline, yellowish obfuscate, veins and pterostigma yellow.

Pubescence: Hairs weakly plumose, reddish yellow; apical fringe reddish yellow; facial fovea dark yellow to yellowish brown; scopa and flocculus with plumose hairs, on the scopa hairs almost as long as width of midtibia.

Head: transverse, HL = 2.54 mm, HW = 2.92 mm, HL/HW = 0.87. – Face: above antennal fossae with longitudinal rugulae, interspaces with rows of scattered coarse punctures. – Facial foveae: comma-shaped, minimum distance of fovea to the lateral ocellus about as wide as the diameter of ocellus, fovea dorsally occupying more than ½ of the distance between compound eye and lateral ocel-

lus. – Compound eyes: inner margins converging slightly towards the ocelli. – Malar space: linear. – Genal area: wider than compound eye. – Antennae: first flagellomere (370 µm) shorter than FL2–4 (490 µm), but longer than FL2–3 (295 µm); FL2–8 transverse, FL9 quadratic, only FL10 longer than wide (305 µm/185 µm, see Fig. 39). – Clypeus: punctures coarse and transverse. – Labrum: process trapezoid, apically weakly truncated, surface and margin of process shiny, other parts of the labrum striated.

Mesosoma: Pronotum: without humeral angle. – Scutum: punctuation posteriorly decreasing, anteriorly denser: interspaces 1 Pd, posteriorly more scattered (interspaces 2 Pd); surface densely shagreened with exception of the posterior third where the integument is weakly shagreened. – Scutellum: mostly smooth and shiny, only at the posterior margin densely shagreened, punctuation scattered, interspaces 2 Pd. – Propodeum: propodeal enclosure distinctly indicated by lateral boundary line, strongly shagreened, anterior side only with fine wrinkles, lateral area of propodeum more weakly shagreened, more shiny, here with sparse punctuation, interspaces 3 Pd; marginal area of propodeum with distinct pubescence on the curved hind margin, also on median part, but hairs very fine. – Mesopleurae: surface shagreened, punctuation dense with crater punctures. – Wing: nervulus postfurcal, distance from basal vein twice the width of the basal vein. – Legs: Hind femur with a row of spines (about 14) as usual for this subgenus, tarsal claws all bidentate.

Metasoma: Terga: Surface of terga strongly shagreened, punctuation with crater punctures, especially on T1, on T2–T5 crater punctures more shallow, interspaces 1–2 Pd; depressions of terga well indicated without punctures, depressed marginal zones. – Sterna: anterior part of S2–S5 without punctuation, posterior part with increasingly dense punctuation, interspaces 1 Pd. – Pygidium: pygidial plate V-shaped, without raised triangular area or carina.

Male (paratype, ID-No. 091201scwe033, BL = 8 mm)

Colouration and pubescence: Mainly as in female, especially the mostly reddish yellow flagellum; hairs of the male longer than those of the females, hairs on the terga distinctly longer than the hind spurs.

Head: transverse, HL = 2.0 mm, HW = 2.5 mm, HL/HW = 0.8. – Antennae: FL1 (length: 325 µm) longer than FL2–3 (length: 290 µm) but shorter as FL2–4 (length: 465 µm), FL2–9 transverse, FL10 quadratic, FL11 longer than wide; with tiny tubercle between antennal sockets.

Mesosoma: Pronotum, scutum, scutellum and mesepisternum as in female, except propodeum: enclosure and lateral sides more roughly shagreened, lateral sides with dense punctuation (interspaces 1 Pd);

Metasoma: Terga: mostly as in female, except surface which is more shiny and only weakly shagreened, especially T1 with smooth parts; punctuation shallow, not distinctly impressed; scattered punctuation (interspaces 3 Pd); T1 with more or less distinct crater punctures, on T2–T5 punctures increasingly shallow, depressions of terga well indicated, punctuation on the marginal zones more or less extinct. – Sterna: S2–S5 sculptured as in terga, but punctures more distinct; Sternum 6 erect, apical margin in the middle with weak emargination. – Genitalia: gonostyli and sternum 8 as illustrated in Figs. 12, 27.

Diagnosis

Andrena maculicornis n. sp. is distinguished from *Andrena curtivalvis* by the lack of dark hairs on the integument. Also the facial foveae of the females of *A. maculicornis* are yellowish and not dark brown as typical for *A. curtivalvis*. The antennae are reddish yellow on the upper side with dark spots, whereas the other species of the *A. taraxaci*-group have darker upper sides of antennae. Sternum 8 is similar to *A. pastellensis* and *A. taraxaci* (compare Figs. 27, 29, 30), but the gonostyli are much broader than in *A. pastellensis* and in *A. taraxaci*, and the apex is rounded instead of transverse and acute (compare Figs. 12, 14). For further characteristics see the keys (section 6).

Remark

The new taxon was discovered in the WARNCKE collection, where specimens without dark pilosity on head and pronotum were assigned to *Andrena curtivalvis*. But in the original description MORICE (1899b) alludes to the dark hairs on face and vertex of *A. curtivalvis*. Furthermore, dissection of a male from Egypt determinated by WARNCKE as *A. taraxaci* ssp. *curtivalvis* showed genitalia with characters different from *A. curtivalvis*. – There are no records of flower visits.

Andrena (Chlorandrena) flavomarginata **n. sp.**

(Fig. 34)

Holotype (♀): Tunisia: Governorate Gabès, 10 km SE Matmata, 9.V.1992, leg. SCHWARZ (Scwz, ID-No. 121107scwe239).

Paratype: Tunisia: Governorate Sousse, 8 km NE Enfidha, 1 ♀, 23.III.2010, leg. SCHWENNINGER (Scwe).

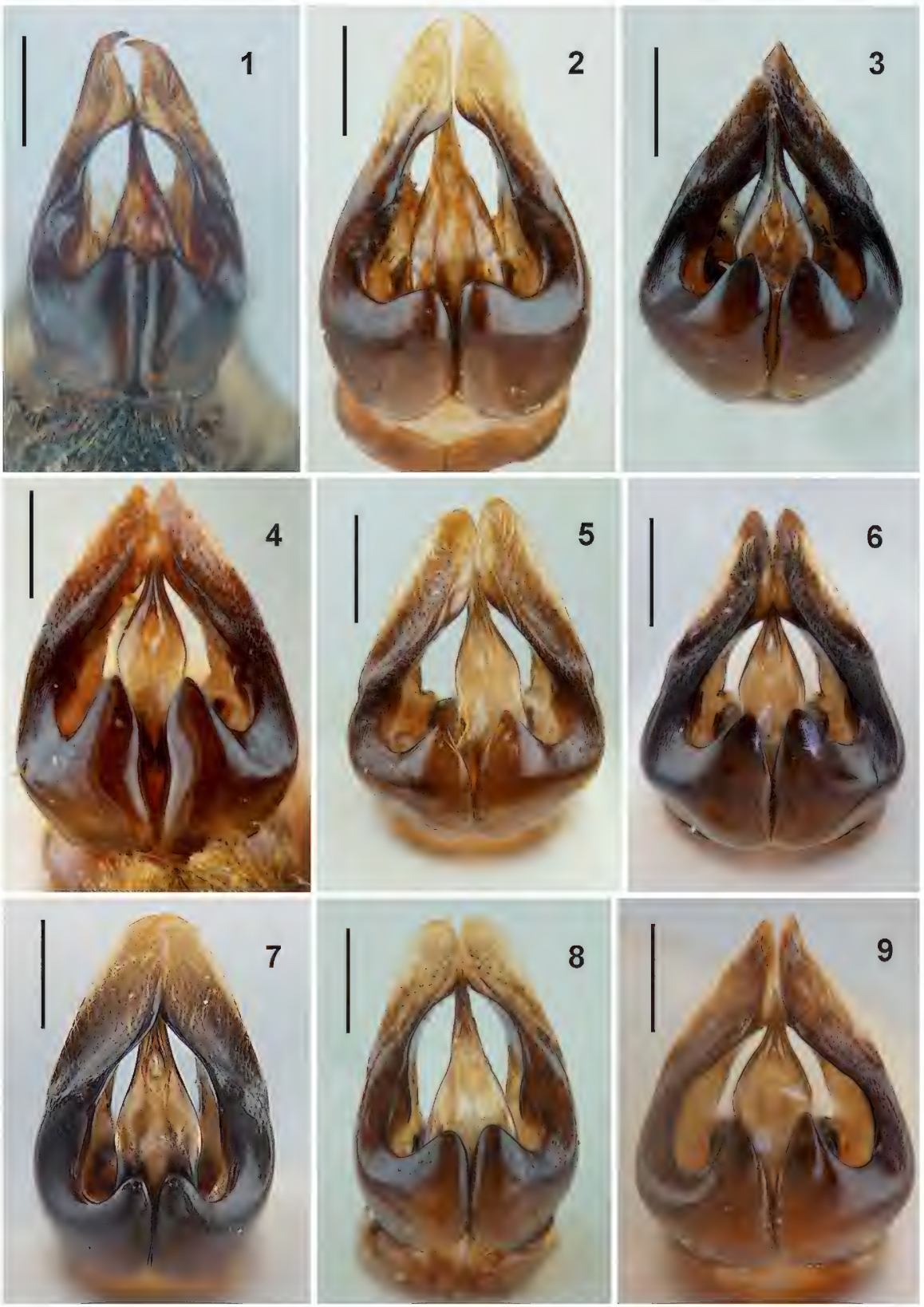
Etymology

The name *flavomarginata* refers to an easily visible feature of this taxon: the broad, transparent, yellowish depressed hind margins of the terga (flavo = Latin for yellow).

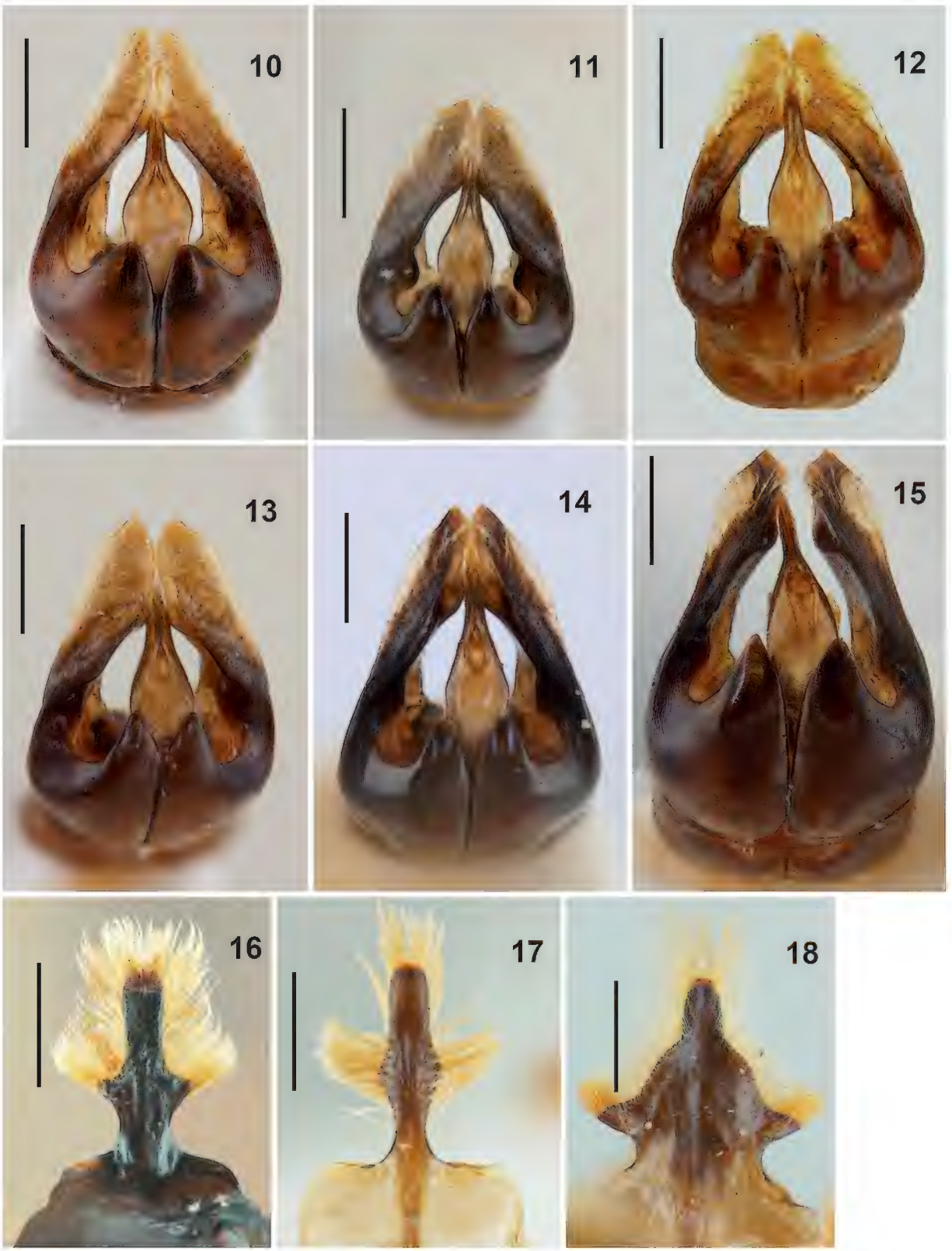
Description

Female (holotype, BL = 9.3 mm)

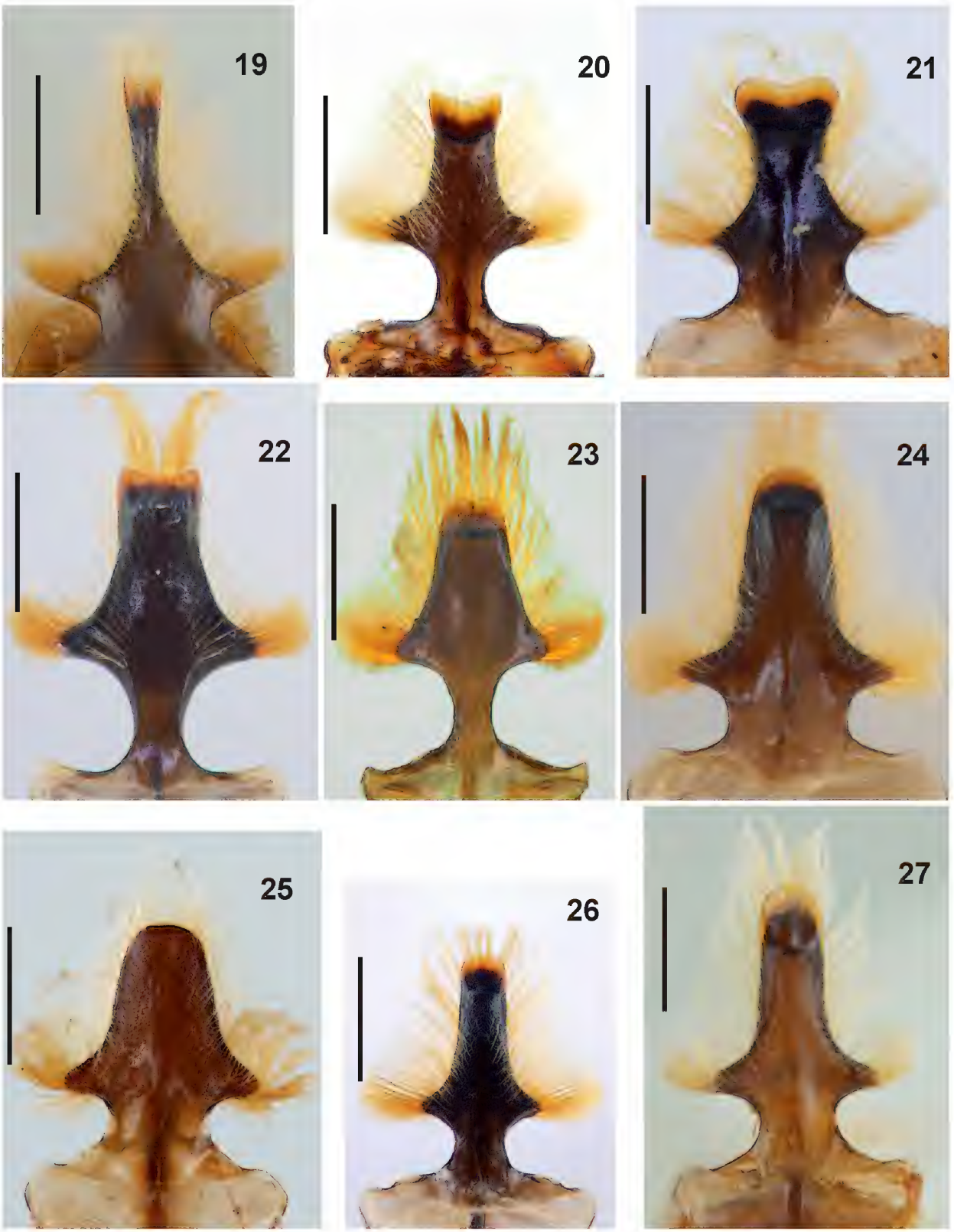
Colouration: Integument black brown, except as follows: mandible at the top (both teeth) reddish, antennal FL4–10 underneath reddish brown, depressions of



Figs. 1–9. *Andrena* spp., male genitalia in dorsal view. – **1**. *A. galbula*. **2**. *A. turanica*. **3**. *A. tricuspidata*. **4**. *A. pseudotaraxaci*. **5**. *A. jerbaensis*. **6**. *A. stabiana*. **7**. *A. senecionis*. **8**. *A. astica*. **9**. *A. rhenana*. – Specimen data see Tab. 1. – Scales: 0.5 mm.

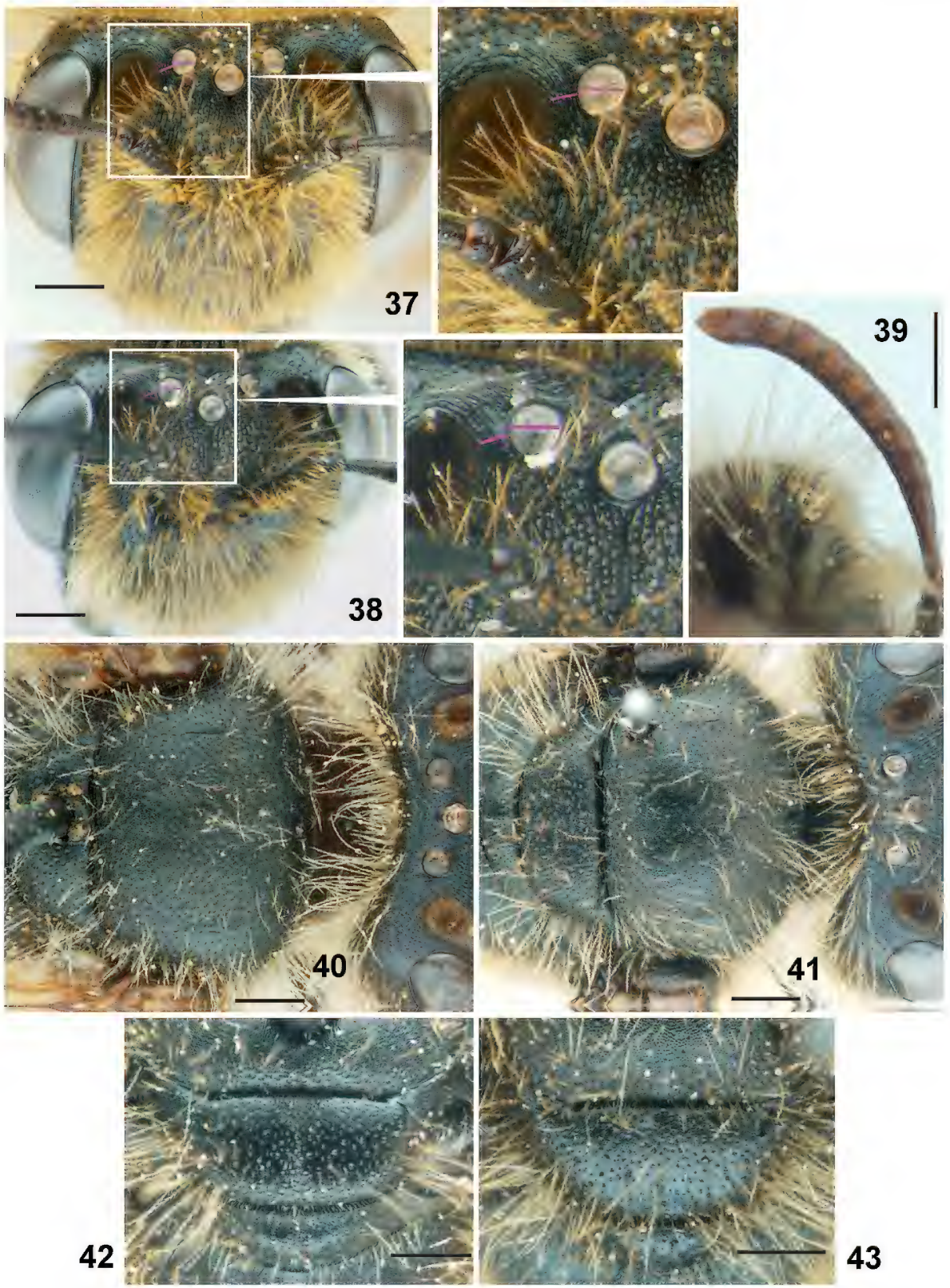


Figs. 10–18. *Andrena* spp., male genitalia (10–15) and apical process of male sternum 8 (16–18) in dorsal view. – **10**. *A. curtivalvis*. **11**. *A. crepidis*. **12**. *A. maculicornis*. **13**. *A. orientana*. **14**. *A. pastellensis*. **15**. *A. taraxaci*. **16**. *A. galbula*. **17**. *A. turanica*. **18**. *A. tricuspidata*. – Specimen data see Tab. 1. – Scales: 0.5 mm.



Figs. 19–27. *Andrena* spp., apical process of male sternum 8 in dorsal view. **19**. *A. pseudotaraxaci*. **20**. *A. jerbaensis*. **21**. *A. stabiana*. **22**. *A. senecionis*. **23**. *A. astica*. **24**. *A. rhenana*. **25**. *A. curtivalvis*. **26**. *A. crepidis*. **27**. *A. maculicornis*. – Specimen data see Tab. 1. – Scales: 0.5 mm.

Figs. 28–36. *Andrena* spp., apical process of male sternum 8 (28–30) and female metasoma (31–36) in dorsal view. – **28**. *A. orientana*. **29**. *A. pastellensis*. **30**. *A. taraxaci*. **31**. *A. turanica*. **32**. *A. orientana*. **33**. *A. rhenana*. **34**. *A. flavomarginata*. **35**. *A. senecionis*. **36**. *A. maculicornis*. – Specimen data see Tab. 1. – Scales: 0.5 mm (28–30), 1 mm (31–36).



Figs. 37–43. *Andrena* spp., frons and area of ocelli of females (37, 38), female left antenna (39), female metasoma (40, 41), and female scutellum (42, 43) in dorsal view. – **37**. *A. jerbaensis*. **38**. *A. crepidis*. **39–40**. *A. maculicornis*. **41**. *A. orientana*. **42**. *A. parataraxaci*. **43**. *A. pastellensis*. – Specimen data see Tab. 1. – Scales: 0.5 mm.

Figs. 44–49. *Andrena* spp., female metasomal terga 1–4 (44–45), female mesosoma (46–47), and marginal area of female propodeum (48–49). – **44**. *A. rhenana*. **45**. *A. pastellensis*. **46**. *A. curtivalvis*. **47–48**. *A. astica*. **49**. *A. taraxaci*. – Specimen data see Tab. 1. – Scales: 1 mm (44–47), 0.2 mm (48–49).

Tab. 1. Data of *Andrena* specimens used for Figs. 1–49

Fig.	Species	ID-No.	Country	Locality	Coordinates	Date	♂/♀	Leg.	Coll.
1	*A. galbula*	121220scwe392	IL	Jerusalem	E35.20 N31.76	15.I.1940	♂	H. Bytinski-Salz	Scer
2	*A. turanica*	091121scwe485	RU	Kubán	E40.44 N45.37	20.IV1972	♂	M. Kocourek	OLML
3	*A. tricuspidata*	141022scwe074	UA	Michurino	E36.41 N45.36	15.IV.1998	♂		Scer
4	*A. parataraxaci*	141022scwe075	TM	Ashgabat	E58.36 N37.94	20.III.1976	♂		Scer
5	*A. jerbaensis*	061024scwe084	TN	Zarzis	E11.10 N33.30	16.II.1992	♂	K. Warncke	OLMW
6	*A. stabiana*	051216scwe154	IT	Giardini Naxos	E15.26 N37.82	15.IV.2005	♂	H. Schwenninger	Scwe
7	*A. senecionis*	061212scwe239	ES	Alicante	W0.56 N38.31	10.IV.2007	♂	H. Schwenninger	Scwe
8	*A. astica*	061024scwe085	TR	Adana	E37.06 N35.26	25.III.1967	♂	K. Warncke	OLMW
9	*A. rhenana*	050301scwe450	DE	Neuried	E7.80 N48.50	3.IV.2000	♂	H. Schwenninger	Scwe
10	*A. curtivalvis*	061212scwe183	TN	Medjez el-Bab	E9.69 N36.65	30.III.1976	♂	U. Lanham et al.	Scwe
11	*A. crepidis*	090102scwe399	CY	Kaminaria	E32.77 N34.90	2.IV.2009	♂	H. Schwenninger	Scwe
12	*A. maculicornis*	091201scwe033	EG	Cairo	E31.29 N30.11	24.II.1918	♂	G. Storey	OLMW
13	*A. orientana*	061212scwe173	TR	Side	E31.37 N36.79	4.IV.1972	♂	K. Warncke	Scwe
14	*A. pastellensis*	060112scwe030	IT	Dolcé	E10.87 N45.59	23.IV.2006	♂	H. Schwenninger	Scwe
15	*A. taraxaci*	091002scwe437	AT	Kappern	E14.13 N48.18	17.IV.2003	♂	F. Gusenleitner	Scwe
16	*A. galbula*	070915scwe098	TR	Diyarbakir	E40.23 N37.94	16.IV.1972	♂	K. Warncke	OLMW
17	*A. turanica*	091121scwe485	RU	Kubán	E40.44 N45.37	20.IV.1972	♂	M. Kocourek	OLML
18	*A. tricuspidata*	141022scwe074	UA	Michurino	E36.41 N45.36	15.IV.1998	♂		Scer
19	*A. parataraxaci*	141022scwe075	TM	Ashgabat	E58.36 N37.94	20.III.1976	♂		Scer
20	*A. jerbaensis*	061024scwe084	TN	Zarzis	E11.10 N33.30	16.II.1992	♂	K. Warncke	OLMW
21	*A. stabiana*	051216scwe154	IT	Giardini Naxos	E15.26 N37.82	15.IV.2005	♂	H. Schwenninger	Scwe
22	*A. senecionis*	061212scwe238	ES	Salinas	W0.89 N39.00	11.IV.2007	♂	H. Schwenninger	Scwe
23	*A. astica*	061024scwe085	TR	Adana	E37.06 N35.26	25.III.1967	♂	K. Warncke	OLMW
24	*A. rhenana*	050301scwe450	DE	Neuried	E7.80 N48.50	3.IV.2000	♂	H. Schwenninger	Scwe
25	*A. curtivalvis*	061212scwe183	TN	Medjez el-Bab	E9.69 N36.65	30.III.1976	♂	U. Lanham et al.	Scwe
26	*A. crepidis*	090102scwe400	CY	Kaminaria	E32.77 N34.90	2.IV.2009	♂	H. Schwenninger	Scwe
27	*A. maculicornis*	091201scwe033	EG	Cairo	E31.29 N30.11	24.II.1918	♂	G. Storey	OLMW
28	*A. orientana*	090102scwe401	CY	Paramytha	E32.98 N34.75	30.III.2009	♂	H. Schwenninger	Scwe
29	*A. pastellensis*	060112scwe143	IT	Dolcé	E10.87 N45.59	23.IV.2006	♂	H. Schwenninger	Scwe
30	*A. taraxaci*	091002scwe437	AT	Kappern	E14.13 N48.18	17.IV.2003	♂	F. Gusenleitner	Scwe
31	*A. turanica*	121107scwe206	KZ	Schymkent	E69.59 N42.30	11.IV.1992	♀	J. Halada	Scwe
32	*A. orientana*	0901031scwe082	CY	Paramytha	E32.98 N34.75	30.III.2009	♀	H. Schwenninger	Scwe
33	*A. rhenana*	061024scwe481	DE	Neuried	E7.78 N48.47	3.IV.2000	♀	H. Schwenninger	Scwe
34	*A. flavomarginata*	121107scwe239	TN	Matmâta	E10.07 N33.49	9.V.1992	♀	M. Schwarz	Scwz
35	*A. senecionis*	100511scwe611	DZ	Annaba (Bône)	E7.77 N36.90		♀	J. Pérez	MNHN
36	*A. maculicornis*	060112scwe152	TN	Gafsa	E8.79 N34.41	21.III.1976	♀	U. Lanham et al.	OLML
37	*A. jerbaensis*	0901031scw076	TN	El May	E10.87 N33.81	06.III.2008	♀	H. Schwenninger	Scwe
38	*A. crepidis*	090102scwe398	CY	Kaminaria	E32.77 N34.90	2.IV.2009	♀	H. Schwenninger	Scwe
39	*A. maculicornis*	060112scwe152	TN	Gafsa	E8.79 N34.41	21.III.1976	♀	U. Lanham et al.	OLMW
40	*A. maculicornis*	061024scwe058	LY	Sahdhdat	E22.38 N32.75	IV.1926	♀	C. Krüger	OLMW
41	*A. orientana*	120120scwe601	CY	Pyrgos	E33.16 N34.72	24.III.2011	♀	H. Schwenninger	Scwe
42	*A. parataraxaci*	121107scwe203	TM	Sandykathy	E62.51 N36.59	28.III.1992	♀	J. Halada	Scwz
43	*A. pastellensis*	061212scwe191	IT	Luino	E8.76 N46.03	4.IV.2007	♀	H. Schwenninger	Scwe
44	*A. rhenana*	061212scwe210	FR	Guillestre	E6.62 N44.67	4.IV.2007	♀	H. Schwenninger	Scwe
45	*A. pastellensis*	061212scwe190	IT	Luino	E8.76 N46.03	4.IV.2007	♀	H. Schwenninger	Scwe
46	*A. curtivalvis*	091121scwe166	ES	Estepona	W5.16 N36.43	1.IV.1985	♀	H. Wolf	OLML
47	*A. astica*	091201scwe052	TR	Ayvalik	E26.70 N39.32	13.IV.1965	♀	K. Warncke	OLMW
48	*A. astica*	120120scwe152	CY	Beylerbeyi	E33.36 N35.30	28.ÎII.2012	♀	H. Schwenninger	Scwe
49	*A. taraxaci*	100511scwe527	RS	Futog	E19.69 N45.26	24.IV.2010	♀	R. Burger	Scwe

terga on the entire surface brightened reddish yellow, posterior margins of the tergal discs also brightened reddish brown, marginal zone of sterna entirely reddish yellow, all tarsi and the apex of the hind tibia reddish yellow, except anterior part of metatarsus 1, which is reddish brown at its base, tibial spurs yellow; wing membranes yellowish, veins and pterostigma reddish yellow, radial vein reddish brown, margin of pterostigma slightly obfuscated.

Pubescence: Hairs mostly reddish yellow; on terga, middle and hind legs, especially scopa, apical fringe more intensive reddish yellow; all hairs plumose, especially trochanteral floccus and scopa; facial foveae light yellow.

Head: transverse, HL = 2.42 mm, HW = 2.98 mm, HL/HW = 0.81. – Frons: face above antennal fossae with longitudinal rugulae, interspaces with coarse punctuation. – Facial foveae: comma-shaped, distance between fovea and lateral ocellus approximately the diameter of the ocellus, fovea dorsally occupying more than ½ of the distance between compound eye and lateral ocellus. – Paraocular area and supraclypeal area: with dense, imbricative punctuation. – Antennae: first flagellomere (425 µm) longer than FL2–3 (353 µm), but shorter than FL2–4 (501 µm); FL2–9 transverse, FL10 longer than wide. – Clypeus: with transverse punctuation. – Labrum: with trapezoidal process, apically weakly truncated, surface of process polished.

Mesosoma: Pronotum: without humeral angle. – Scutum: surface shagreened, posterior third only weakly shagreened, punctuation significant, deeply impressed and moderately dense, interspaces about 1–2 Pd. – Scutellum: smooth, like polished, only at posterior margin intensively shagreened; punctuation of anterior margin and median area dense (interspaces about ½–1 Pd), beside the median area more scattered and coarser (interspaces 2–3 Pd). – Propodeum: enclosure (propodeal triangle) indicated by a fine lateral boundary line, outer margin with wrinkles, shagreened, anterior margin with wrinkles; lateral area of propodeum with coarse crater punctures (interspaces 2 Pd), marginal area of propodeum on the median part without pubescence or punctures, shagreen finely transverse (like Fig. 48). – Legs: hind femur with a row of spines (left side 14, right side 13) as usual for this subgenus, tarsal claws all bidentate. – Mesopleurae: surface shagreened, on ⅔ of the anterior part punctuation densely imbricated, towards the posterior margin punctuation decreasing and more shallow, interspaces up to more than 3 Pd. – Wing: nervulus interstitial.

Metasoma: Terga: T1 mostly polished, but depressions distinctly shagreened, T2–T5 entirely shagreened; density of punctuation increasing towards apex, disc of T1 more scattered (interspaces > 2 Pd), especially lateral parts of T2–T4 with dense, imbricative punctuation (interspaces < ½ Pd); predominantly with crater punctures, except declining anterior part of T1. – Pygidium: pygidial plate U-shaped, without raised triangular area or carina. – Sterna: anterior parts of S2–S5 without or with extremely fine scattered punctuation, up to the posterior margin increasingly denser and coarser, sometimes imbricative.

Diagnosis (females)

The yellowish depressions of the terga of *A. flavomarginata* resemble those of *A. senecionis*, but in *A. senecionis* the depressions are reddish brown in their anterior quarter, whereas they are entirely yellow in *A. flavomarginata*. All tarsi of *A. flavomarginata* are reddish yellow, whereas the tarsi of *A. senecionis* are reddish brown. The scutellum of *A. flavomarginata* is finely punctured, and in the middle of the lateral part the punctuation is scattered (interspaces of 3–4 Pd). In contrast, the punctuation of *A. senecionis* is coarse and the interspaces are smaller (almost 2 Pd). For further characteristics see the keys (section 6).

Remark

In Tunisia the author collected a female of the *Andrena taraxaci*-group with yellowish depressions of terga that looked like a small *A. senecionis*. On closer examination some characters were found that indicated a new species. As the description on the base of a single specimen can be problematic due to interspecific variability, the finding of another female in the collection of Maximilian Schwarz with corresponding features enabled the description of the new species.

Observation of flower visits

Only one record of flower visit is known. The author collected the female paratype on a yellow composite (Asteraceae, Cichorieae).

5 Description of the hitherto unknown female of *Andrena (Chlorandrena) parataraxaci* Scheuchl 2010

Examined material

Turkmenistan: Sandykathy: 28.III.–4.IV.1992, 1 ♀, leg. J. Halada (Scwe, ID-No. 121107scwe183); 28.III.–4.IV.1992, 9 ♀♀, 1 ♂, leg. J. Halada; 11 ♀♀, 1 ♂, leg. K. Denes (all Scwz); 4 ♀♀, 3 ♂♂, leg. K. Denes, 2 ♀♀, leg. J. Halada (all Scwe).

Female [BL = 9.3–10.9 mm (n = 29)]

Colouration: Integument dark brown, except as follows: FL6–11 underneath reddish brown, top of flagellum, also on upper side, dark reddish brown, mandible at the top (both teeth) reddish, depressions of terga on nearly the entire surface reddish brown, marginal zone of sterna and claws reddish yellow, tibial spurs transparent reddish yellow, wing membranes hyaline, slightly yellowish, veins and pterostigma reddish yellow, radial vein reddish brown.

Pubescence: Hairs light yellow, plumose, especially trochanteral floccus and scopa; facial fovea light yellow.

Head: transverse, HL = 2.85 mm, HW = 3.22 mm, HL/HW = 0.9. – Antennae: first flagellomere (472 µm) longer than FL2–3 (374 µm), but shorter than FL2–4 (580 µm); FL2–7 transverse, FL8–9 square, FL10 longer than wide. – Compound eyes: inner margins more or less parallel. – Facial foveae: dorsally deeply impressed and broad, comma-shaped, ending beneath the base of antennae, here as wide as the width of scape; fovea dorsally occupying about ¾ the distance between compound eye and lateral ocellus, distance between fovea and lateral ocellus smaller than width of lateral ocellus. – Frons: face above antennal fossae with longitudinal rugulae, interspaces with rows of punctures. – Clypeus: punctures transverse and coarse, punctuation giving the impression of horizontal stripes. – Labrum: process trapezoid, medially emarginate, surface shiny; labrum beneath process with dense pubescence covering the entire surface.

Mesosoma: Pronotum: without humeral angle, strongly shagreened. – Scutum: surface shagreened, punctuation with interspaces mostly twice as large as Pd, interspaces on posterior third of scutum sometimes more than twice of Pd. – Scutellum: posterior part smooth and shiny, anterior part densely shagreened, median part with extremely dense punctuation (Pd < ½), indicating a median zone (Fig. 42). – Mesopleurae: anterior part with coarse and dense punctuation (interspaces < 1 Pd), on posterior part, especially above mesocoxa, punctuation much more scattered (interspaces up to 3 Pd). – Propodeum: triangle area indicated by a thin lateral boundary line, strongly shagreened, anterior part with small wrinkles, without distinct medial line, uniformly shagreened; lateral parts of propodeum lesser shagreened with large punctures (interspaces 3 Pd). – Wing: nervulus strongly postfurcal, distance from basal vein usually more than twice the width of basal vein. – Legs: Hind femur with a row of about 16 spines, tarsal claws all bidentate.

Metasoma: Terga: T1–T5 shagreened, medial area of T1 weakly shagreened, more shiny, punctures on T1 deep (crater punctures), T2–T5 punctures more shallow, punctuation more or less dense (interspaces about 1–2 Pd), depressions of terga distinctly separated from the disc without punctuation. – Pygidium: pygidial plate V-shaped, without raised triangular area or carina. – Sterna: anterior parts of S2–S5 with a small pointless area, towards posterior margin punctuation increasingly denser and coarser, imbricative (distances ½ Pd).

Diagnosis

The female of *Andrena parataraxaci* can be distinguished from the other females of the group by the combination of the following characters: Without apical hair bands on the depressions of terga 2–4, nearest distance of foveae to lateral ocelli as wide as the diameter of one ocellus, pubescence yellowish brown, depressions of terga reddish brown, upper side of antennae entirely dark brown, scutum all over shagreened without polished areas, foveae light yellow, median part of scutellum with extremely dense punctuation (interspaces Pd < ½) indicating a median zone or line (Fig. 42).

Remark

Among the comprehensive material of the *Andrena taraxaci*-group from Turkmenistan in the collection of M. Schwarz the author could identify males belonging to the taxon *A. parataraxaci*. Together with these males a series of females had been collected in the same localities at the same time. Since some characters of these females match with those of the males, the description of the hitherto unknown female of *A. parataraxaci* was possible. Common characters are, e. g., wing venation, punctuation of scutum and tergal sterna, as well as the shape of the triangle area of the propodeum. – There are no records of flower visits.

6 Keys to the Western Palaearctic species of the *Andrena taraxaci*-group

The most reliable way to identify the species of the *A. taraxaci*-group is to compare the male genitalia. Already Morice (1899a) stated the importance of the differential diagnostic characteristics of sternum 8 and the genitalia. Therefore, a careful preparation of this body parts is recommended (see section 2). To facilitate the application of the key, sterna 8 and genitalia of similar species are grouped together in Figs. 1–27. Males of *A. flavomarginata* n. sp. are still unknown.

Gusenleitner & Schwarz (2002: 746) pointed out that in many cases the identification of females within the *Andrena taraxaci*-group can be difficult or even impossible. Worn specimens may cause problems, thus fresh specimens are needed to use the key. The knowledge of the provenance of the specimens is of importance (see Tab. 2). Females of *A. galbula* and *A. tricuspidata* are still unknown.

Males

1 Apex of the gonostyli curved proximally, claw-shaped, ending in a spine (Fig. 1). – Process of sternum 8 with distinct lateral teeth (Fig. 16)..... ***A. galbula*** Warncke

– Apex of the gonostyli not claw-shaped..... **2**

2 Process of sternum 8 without lateral teeth, only with lateral protuberances (Fig. 17)..... ***A. turanica*** Osytshnjuk

– Process of sternum 8 with distinct lateral teeth. **3**

3 Process of sternum 8 posterior to lateral teeth strongly triangular (Fig. 18). .....***A. tricuspidata*** Scheuchl

– Process of sternum 8 slender..... **4**

4 Process of sternum 8 apically emarginate (concave) or truncated (Figs. 20–23). **5**
– Process of sternum 8 apically rounded (convex). **9**
5 Apical part of sternum 8 extremely slender, rod shaped, base of process 3 times as wide as the apex (Fig. 19). – Inner margin of gonostyli with a straight, strong rim, apex acute (Fig. 4). ..... ***A. parataraxaci*** Scheuchl
– Apical part of sternum 8 wider, base of process approximately as wide as apex. **6**
6 Apex of sternum 8 distinctly emarginate (concave); gonostyli tapering apically (Figs. 20–21). **7**
– Apex of sternum 8 truncated, more or less straight (Figs. 22–23); apex of gonostyli broadening, more rounded (Figs. 7, 8). **8**
7 Base of process of sternum 8 smaller than apex (Fig. 20); outer margin of gonostyli widened to the apex (convex) and translucent (on one third of its width) (Fig. 5). ..... ***A. jerbaensis* n. sp.**
– Base of process of sternum 8 broader than apex (Fig. 21); outer margin of gonostyli straight, translucent area smaller than a quarter of the width of gonostylus (Fig. 6). ..... ***A. stabiana*** Morice
8 Apical part of sternum 8 with parallel sides, apex truncated; teeth of process protruding (Fig. 22); gonocoxal lobes well developed (Fig. 7). ..... ***A. senecionis*** Pérez
– Sides of sternum 8 tapering apically, apex straight or weakly convex; teeth of process small, only weakly developed (Fig. 23); gonocoxal lobes smaller (Fig. 8). ..... ***A. astica*** Warncke
9 Apical part of process of sternum 8 stocky, apex broadly rounded (conical) (Figs. 24–25). **10**
– Apical part of process of sternum 8 slender, rod-shaped (Figs. 26–30). **11**
10 Apex of gonostyli with dense, deeply impressed punctuation, gonocoxal lobes strongly pronounced, ending in a point (Fig. 9); process of sternum 8 longer (Fig. 24). ..... ***A. rhenana*** Stoeckhert
– Punctuation of gonostyli scattered, especially on the rim of the inner margin, gonocoxal lobes smaller, apex broadly rounded (Fig. 10); process of sternum 8 shorter (Fig. 25). ..... ***A. curtivalvis*** Morice
11 Process of sternum 8 very small, bar-shaped, equal width posterior and anterior to the lateral teeth (Fig. 26); genitalia very small, smallest within the *A. taraxaci*-group, about one third smaller than in *A. taraxaci* (compare Figs. 11 and 15). ..... ***A. crepidis* n. sp.**
– Process of sternum 8 broader, especially posterior to lateral teeth (Figs. 27–30); genitalia and apical process of sternum 8 larger. **12**
12 Apex of gonostyli between internal rim and outer margin widened, broadly rounded (Figs. 12–13). **13**
– Apex of gonostyli between internal rim and outer margin more or less parallel, ending in a point (Figs. 14–15). **14**
13 Lateral teeth of sternum 8 obtuse, process posterior to lateral teeth parallel, smaller; margin of gonostyli apically convex (Figs. 12, 27). ..... ***A. maculicornis* n. sp.**
– Lateral teeth of sternum 8 acute, process posterior to lateral teeth broader, converging; margin of gonostyli apically concave (Figs. 13, 28). ..... ***A. orientana*** Warncke
14 Genitalia and process of sternum 8 shorter; apex of gonostyli smaller, only weakly convex (Figs. 14, 29). ..... ***A. pastellensis*** Schwenninger
– Genitalia and process of sternum 8 longer; apex of gonostyli wider and outer margin bulged (Figs. 15, 30). ..... ***A. taraxaci*** Giraud

Females

1 Terga 2–4 with bands of dense, yellowish white hairs covering almost 50 % of the surface of the depressions, bands on T2 in the middle narrowly interrupted, T3 and T4 complete (Fig. 31); T1 with distinct crater punctures, punctuation of T2–T4 more shallow and weaker. ..... ***A. turanica*** Osytshnjuk
– Terga 2–4 without strongly developed hair bands on the depressions, hind margins of terga generally with a row of sparse hairs that do not cover the entire surface; if bands on the hind margins are present, they are covering at most a quarter of the surface of the depressions (Figs. 32, 33). **2**
2 Fovea dorsally wider, nearest distance to the lateral ocellus distinctly smaller than the diameter of the lateral ocellus (see pink markers in Figs. 37, 38). **3**
– Fovea dorsally smaller, nearest distance to the lateral ocellus as wide as the diameter of ocellus (Figs. 41, 46). **4**
3 Flagellum underside brightened reddish yellow; anterior and posterior part of scutum with dense punctuation (interspaces about 1 Pd); veins and pterostigma of wings yellowish brown; nervulus weakly postfurcal (distance to basal vein < 2 times the width of nervulus); lateral parts of propodeum with imbricative rugose punctures; metasoma shagreened with distinct crater punctures, also on tergum 2; body length on average 9.1 mm. ..... ***A. jerbaensis* n. sp.**
– Flagellum underside not brightened, more or less reddish brown; punctures of scutum scattered, interspaces 3 Pd; wing veins and pterostigma reddish brown; nervulus strongly postfurcal (distance to basal vein > 4 times the width of nervulus); lateral parts of propodeum with finer punctures, margins of punctures lesser protruding; metasoma more brilliant, only weakly shagreened, especially tergum 1, punctures on terga 2 and 3 not distinctly crater-like; body length on average 8.25 mm. ..... ***A. crepidis* n. sp.**
4 Facial foveae bright, yellow or yellowish brown; scape and head in frontal view with uniformly bright pubescence, predominantly yellow brown or reddish brown, at most single dark brown hairs around the upper margin of compound eyes, often visible only at magnification ≥ 40× (Figs. 37–38). **5**
– Foveae dark, brown; scape and head with brown hairs, at least on the apex of the scape; hairs around compound eyes, on the paraocellar area (Fig. 46) and on frons extensively dark, brown to dark brown, pubescence sometimes covering more parts of the head. **11**
5 Depressions of terga, especially T3 and T4, extensively yellowish brightened, transparent (Figs. 34–35); nervulus antefurcal or interstitial. **6**
– Depressions of terga reddish brown, at least the hind margin narrowly yellowish brightened (Fig. 36); nervulus postfurcal, except in *A. rhenana* (interstitial). **7**
6 Tarsi and tibia 3 at least at the apex reddish yellow; entire depressions of the terga yellowish brightened and posterior margin of the discs also brightened, here reddish brown (Fig. 34); distance of fovea to the lateral ocellus as wide as the diameter of the ocellus; body length 9 mm. ..... ***A. flavomarginata* n. sp.**
– Tarsi reddish brown; depressions posteriorly brightened, reddish yellow, but anterior quarter reddish brown (Fig. 35); distance of fovea to the lateral ocellus wider than the diameter of the ocellus; body length 11 mm. ..... ***A. senecionis*** Pérez
7 Upper side of antenna reddish yellow, only the base of the flagellomeres brown (dark spotted) (Fig. 39), underneath from flagellomere 5 towards the apex bright reddish yellow.

– Nervulus distinctly postfurcal; scutum with dense crater punctures, interspaces on median area about 1 Pd (Fig. 40).. ..... ***A. maculicornis* n. sp.**

– Upper side of antenna completely dark brown, flagellum underneath at most reddish brown..... **8**

8 Scutum in its posterior half polished or very faintly shagreened, punctures on this shining area scattered, interspaces of about 4–5 Pd (Fig. 41); depressions on T3 and T4 with yellowish white hair bands covering the posterior quarter of the depressions, on T4 complete, on T3 interrupted medially (Fig. 32)..... ***A. orientana*** Warncke

– Scutum all over shagreened, without polished areas, and punctuation much denser; pubescence on terga sparsely, not densely covering the surface of the posterior margins..... **9**

9 Facial foveae light yellow; scutellum medially with extremely dense punctuation (Pd < ½), indicating a median zone or line (Fig. 42)..... ***A. parataraxaci*** Scheuchl

– Foveae darker, yellowish brown; scutellum without distinct median zone, punctuation medially mostly scattered, interspaces < 1 Pd (Fig. 43)..... **10**

10 Nervulus interstitial or weakly postfurcal (distance from basal vein at most 1 diameter of nervulus); depressions of terga only weakly impressed, not well separated from the disk (Fig. 44)..... ***A. rhenana*** Stoeckhert

– Nervulus distinctly postfurcal, distance from basal vein at least 2 diameters of nervulus; depressions of terga distinctly separated from the disk, impression step-like (Fig. 45). .... ***A. pastellensis*** Schwenninger

11 Posterior half of scutum with scattered punctuation, interspaces about 3 Pd, polished (Fig. 46) (western populations: MA, ES) or at most weakly shagreened (eastern populations: DZ, TN)..... ***A. curtivalvis*** Morice

– Scutum all over intensively shagreened, without polished or extremely weak shagreened areas and with denser punctuation (interspaces almost 2 Pd) (Fig. 47)..... **12**

12 Punctuation of scutum very shallow, disappearing in the shagreen especially in the posterior area (like *A. subopaca*); scutum and scutellum strongly shagreened (Fig. 47); median part of marginal area of propodeum without pubescence or punctures (Fig. 48)..... ***A. astica*** Warncke

– Punctuation of scutum in the posterior part deeply impressed; mainly scutellum with weak shagreen, partly polished and shiny; median part of marginal area of propodeum with pubescence and punctuation (Fig. 49)..... **13**

13 Punctuation of scutum dense and deeply impressed (interspaces of 1–2 Pd), scutellum on anterior part mostly polished, surface near posterior margin rougher due to extremely dense punctuation (interspaces of ½ Pd); terga with regular dense punctuation (interspaces of 1–2 Pd)..... ..... ***A. taraxaci*** Giraud

– Punctuation of scutum and scutellum more scattered, especially on the posterior part of scutum (interspaces 3–4 Pd), scutellum on anterior part with fine shagreen, more brilliant; terga more shiny, weakly shagreened, punctuation extremely shallow..... ***A. stabiana*** Morice

7 Distribution of the species of the *Andrena taraxaci*-group in the Western Palaearctic

The country records of the 16 currently known species of the *Andrena taraxaci*-group in the Western Palaearctic are listed in Tab. 2.

Tab. 2. Distribution of the species of the *Andrena taraxaci*-group, according to Gusenleitner & Schwarz (2002) and Scheuchl (2010), supplemented by own results. – Abbreviations of countries following International Organization for Standardization (ISO 3166).

Species	Country records
A. astica Warncke 1965	CY, GE, GR, IL, TR
A. crepidis n. sp.	CY (endemic)
A. curtivalvis Morice 1899	DZ, ES, MA, TN
A. flavomarginata n. sp.	TN
A. galbula Warncke 1975	TR, IL
A. jerbaensis n. sp.	TN
A. maculicornis n. sp.	EG, LY, TN
A. orientana Warncke 1965	BG, CY, HU, IL, JO, MK, RO, SY, TR; UA
A. parataraxaci Scheuchl 2010	TM, TR
A. pastellensis Schwenninger 2007	CH, IT
A. rhenana Stoeckhert 1930	CH, DE, ES, FR, MA, PT
A. senecionis Pérez 1895	DZ, ES, FR, IT, LY, MA, PT, TN
A. stabiana Morice 1899	F (Corsica), IT,CH
A. taraxaci Giraud 1861	AT, CZ, DE, GR, HU, HR, PL, RO; RS, RU, SK, SL, TR, UA
A. tricuspidata Scheuchl 2010	UA
A. turanica Osytshnjuk 1993	RU, TJ, TM, UZ

Andrena taraxaci has a wide range and is spread from Central Europe to Eastern Europe, reaching the northern parts of Greece and Turkey in the south.

Also *Andrena senecionis* has a wide distribution. This species ranges in North Africa from Libya to Morocco and northwards from the Iberian Peninsula across France to Italy.

A more western distribution has *Andrena rhenana*. Its range extends from South-West Germany to France and the Iberian Peninsula and reaches Morocco in the south.

A western Mediterranean range, but with main occurrence in the south, has *Andrena curtivalvis*. This species is distributed from Libya in the east, across Tunisia, Algeria and Morocco to the west. In this study the author had discovered *Andrena curtivalvis* among hitherto unidentified female specimens. They were collected from the following localities: ES, Andalucía: Algeciras, W5.46 N36.12, 26.III.1975, 4 ♀♀; San Roque, W5.395 N36.211, 31.III.1975, 1 ♀; Estepona, W5.16 N36.43, 26.III.1975, 6 ♀♀, all specimens leg. Grünwald (ZSM); Estepona, W5.16 N36.43, 26.III.1975, 1 ♀, leg. H. Wolf (OLML). Thus, *Andrena curtivalvis* is recorded for the first time in Europe and Spain. During a field trip to Andalucía in April 2014 the author checked flowers of Asteraceae (Cichorieae) at the reported localities, in the hope to find *A. curtivalvis*. Espe-

cially in the vicinity of Estepona and Algeciras, but also in a radius of 100 km, a total of 36 localities were investigated. Despite the tightly focused examination of suitable food sources, only two females (both in Scwe) could be collected from the following localities: Estepona, 5 km SE Casares (W6.74 N40.74, 11.IV.2014, 1 ♀) and San Martin de Tessorilo (W5.36 N36.33, 6.IV.2014, 1 ♀). Based on this findings *A. curtivalvis* is considered as an indigenous species of Europe with an extremely rare occurrence in Spain.

Andrena stabiana and *A. pastellensis* occur in Italy and Switzerland. *A. stabiana* could be detected in Corsica, *A. pastellensis* reaches northward to the southern part of the Alps in Switzerland (SCHWENNINGER 2007). The male of *A. stabiana* recorded in the same paper from Tunisia (leg. et coll. F. AMIET) should be, according to the current knowledge, assigned to *A. jerbaensis*.

Andrena astica and *A. galbula* show an Eastern Mediterranean distribution. *A. astica* occurs northwards up to Georgia. *A. orientana* is also distributed in the Eastern Mediterranean but occurs on the Balkan Peninsula and has its northern border in the Ukraine. *A. tricuspidata* is so far only known from two specimens found in Crimea on the Kerch Peninsula (Ukraine) (pers. comm. ERWIN SCHEUCHL).

Species of the Middle Asian steppes, *Andrena turanica* and *A. parataraxaci*, reach the West Palaearctic. Among yet unidentified material a male of *A. turanica* could be detected from the Northern Caucasus (South-East Russia). It was collected on the 24.IV.1972 by KOCOUREK and is labelled "Kuban" (OLML, ID-No. 091121scwe485). *A. parataraxaci* is also recorded from Turkey (SCHEUCHL 2010).

The distribution of the four newly described species is illustrated in Fig. 50. This map shows that *Andrena jerbaensis* occurs in the south-eastern part of Tunisia, on the island of Jerba and adjacent areas within 100 km (Tataouine).

Andrena crepidis is endemic to Cyprus. The currently known locations are clearings and rocky slopes within the pine forests of the Troodos Mountains at an altitude from 400 to 600 m. Excursions during the flight season of *A. crepidis* in March or April 2009, 2011, 2012 and 2013 had been undertaken. Although potential available food plants in appropriate habitats were intensively examined in other parts of Cyprus including the Kyrenia Mountains, especially the Pentadactylos Mountains, and also in the vicinity of Limassol, these attempts yielded no further records of this taxon. According to the current state of knowledge this species is extremely rare and restricted to a very small area in the Troodos Mountains. The former locality Ayia Phyla, today situated within the settlement area of Limassol, is probably destroyed for this bee.

Fig. 50. Distribution of the new species of the *Andrena taraxaci*-group (base map: © OpenStreetMap contributors).

Andrena maculicornis was found in the south eastern Mediterranean region from Tunisia (Gafsa) in the west and Libya (Cyrenaica) up to Nile River delta in Egypt in the east. Most records originate from the Cyrenaica on the eastern coastal region of Libya.

Andrena flavomarginata is known only from two localities in the northern and southern part of Tunisia. The author collected one specimen on a field margin near Enfidha.

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On the genus *Reisserita* Agenjo in North Africa, with descriptions of two new species (Lepidoptera: Tineidae)

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Abstract

Reisserita cinnamomella and *R. meyi* are described as new species from Morocco. The species *pseudoranella* Petersen & Gaedike, 1979, described in *Reisserita* Agenjo, 1952, is transferred to *Anomalotinea* Spuler, 1910. A key to the hitherto known North African species of *Reisserita* (male genitalia), a checklist, and illustrations of adults, male genitalia and the hitherto known female genitalia of three species, are presented.

Keywords: Lepidoptera, Tineidae, *Reisserita*, new species; new combination, key.

Zusammenfassung

Es werden *Reisserita cinnamomella* und *R. meyi* als neue Arten aus Marokko beschrieben. Die Art *pseudoranella* Petersen & Gaedike, 1979, beschrieben als *Reisserita* Agenjo, 1952, wird in die Gattung *Anomalotinea* Spuler, 1910 versetzt. Ein Bestimmungsschlüssel für die bisher bekannten nordafrikanischen Arten der Gattung (männliche Genitalien), eine Checkliste, sowie Abbildungen der Falter, der männlichen Genitalien und der drei bisher bekannten weiblichen Genitalien, werden vorgelegt.

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1 Introduction

Through the courtesy of Daniel Bartsch (SMNS) I was able to study still undetermined tineid material from North Africa from the Scholz collection, housed in the SMNS. The examination revealed a new species of the genus *Reisserita* Agenjo, 1952 (see Agenjo 1952) from Morocco. Additionally, I received some specimens from Morocco from Wolfram Mey (ZMHB), which contain a second new species of this genus. The description of these two taxa offers the opportunity to summarise current knowledge on the members of the genus known from the countries of northern Africa. As the species are superficially very uniform (without any pattern on the forewings), and as females are known only for some of them, the key (section 5) uses only characters of the male genitalia.

Acronyms of depositories

BMNH The Natural History Museum, London, United Kingdom
MNHN Muséum National d'Histoire Naturelle, Paris, France
NMW Naturhistorisches Museum, Vienna, Austria
PCB Private collection Erich Bettag, Dudenhofen, Germany, now in Naturhistorisches Museum, Mainz, Germany
PCD Private collection Georg Derra, Reckendorf, Germany
PCS Private collection Paul Sammut, Malta
SDEI Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany
SMNK Staatliches Museum für Naturkunde, Karlsruhe, Germany
SMNS Staatliches Museum für Naturkunde, Stuttgart, Germany
ZFMK Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany
ZMHB Museum für Naturkunde der Humboldt-Universität, Berlin, Germany
ZMUC Zoological Museum, Copenhagen, Denmark

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I wish to thank Daniel Bartsch (SMNS) and Wolfram Mey (ZMHB) for the loan of the interesting material and Christian Kutzscher (SDEI) for making colour photos of the adults. Special thanks to Andrew Liston (SDEI) for the linguistic corrections.

2 Materials

The specimens used for photos and genital drawings are deposited in the following collections: BMNH (Fig. 29); MNHN (Fig. 24); NMW (Figs. 15, 16); PCB (Figs 10, 23); PCD (Figs. 12, 25); PCS (Fig. 20); SDEI (Figs. 1–3, 7, 9, 11, 13); SMNK (Figs. 14, 26); SMNS (Figs 8, 21); ZFMK (Figs. 6, 19); ZMHB (Figs 5, 18, 22, 28); ZMUC (Figs. 4, 17).

3 General remarks on the genus *Reisserita*

The genus *Reisserita* is a member of the subfamily Tineinae. It is distributed only in the Palaearctic. To date (including the two new species described in section 4), 20 species are known. 13 species are currently described from North Africa (Baker 1885, Gaedike 2009a, b, Mann 1859, Petersen 1957, Petersen & Gaedike 1979, Turati 1926, Zerny 1935, and the present paper). All species are unicolourous, without any markings on the forewings. Superficially the genus is similar to *Anomalotinea* Spuler, 1910 (see Spuler 1910), but in the male genitalia there are clear differences. The uncus in *Reisserita* has a more or less V-shaped incision, while in *Anomalotinea* the uncus has a hook-shaped process medially. This is why the taxon *pseudoranella* Petersen & Gaedike, 1979, described as member of the genus *Reisserita*, has to be transferred to the genus *Anomalotinea* Spuler, 1910: *Anomalotinea pseudoranella* (Petersen & Gaedike, 1979), **n. comb.**

4 Descriptions of new species

Reisserita cinnamomella **n. sp.**
(Figs. 8, 21)

Holotype: ♂, "Marokko: Mittlerer Atlas LF [lux], 20 km nördl. Midelt, 5.vii.1996, leg. Lingenhöle", "coll. A. Scholz, Vöhringen, SMNS-Lep. 1999-09", "Gen. präp. [genitalia slide] Gaedike NR: 8174", "Holotypus, *Reisserita cinnamomella* sp. n., ♂, det. R. Gaedike 2014", SMNS.

Etymology

The species name refers to the colouration of the holotype.

Description

Wingspan 16 mm; head brush cinnamon coloured, antennae grey-brown, scapus with pecten; labial palpi on inside creamy, on outside darker, second segment bristled; thorax including tegulae, and forewings also cinnamon coloured; forewings without any pattern; hindwings grey.

Male genitalia (Fig. 21): Uncus with two pointed lobi, separated by V-shaped incision; gnathos arms angled after the first half, with pointed tip; tegumen and vinculum broad, saccus as long as uncus-tegumen complex, narrower to rounded tip; valvae with long apodemes, short, the first two-thirds of costal edge parallel-sided, then obliquely directed upwards to a rounded tip, ventral edge also parallel-sided, ending in a short bristled process, apical edge between ventral process and rounded costal tip with a small bristled finger-shaped process; phallus more than twice as long as valva, thin, with two thin, pointed cornuti.

Differential diagnosis

Characteristic for this new species are the colouration of the imago, and in the male genitalia the shape of the valvae and the presence of two long thin cornuti on the phallus. On the differences to other species see the key (section 5).

Reisserita meyi **n. sp.**
(Figs. 5, 18)

Holotype: ♂, "Marokko, Agadir, Residence AIF aras, 20.–28.4.2009 LF [lux], leg. W. Mey", "Gen. präp. [genitalia slide] Gaedike NR: 8148", "Holotypus, *Reisserita meyi* sp. n., ♂, det. R. Gaedike 2014", ZMHB.

Paratype: 1 ♂, same data as holotype, but "Gen. präp. [genitalia slide] Gaedike NR: 8136", SDEI.

Etymology

The new species is named after Wolfram Mey (Berlin), the collector of the types.

Description

Wingspan ca. 15 mm (specimens not spread); head brush pale yellow; antennae dark brown, scapus on upper side pale yellow, with pecten, flagellum ringed; labial palpi on inside pale yellow, on outside brown, second segment bristled; thorax, tegulae and forewings golden brown to cinnamon; hindwings grey.

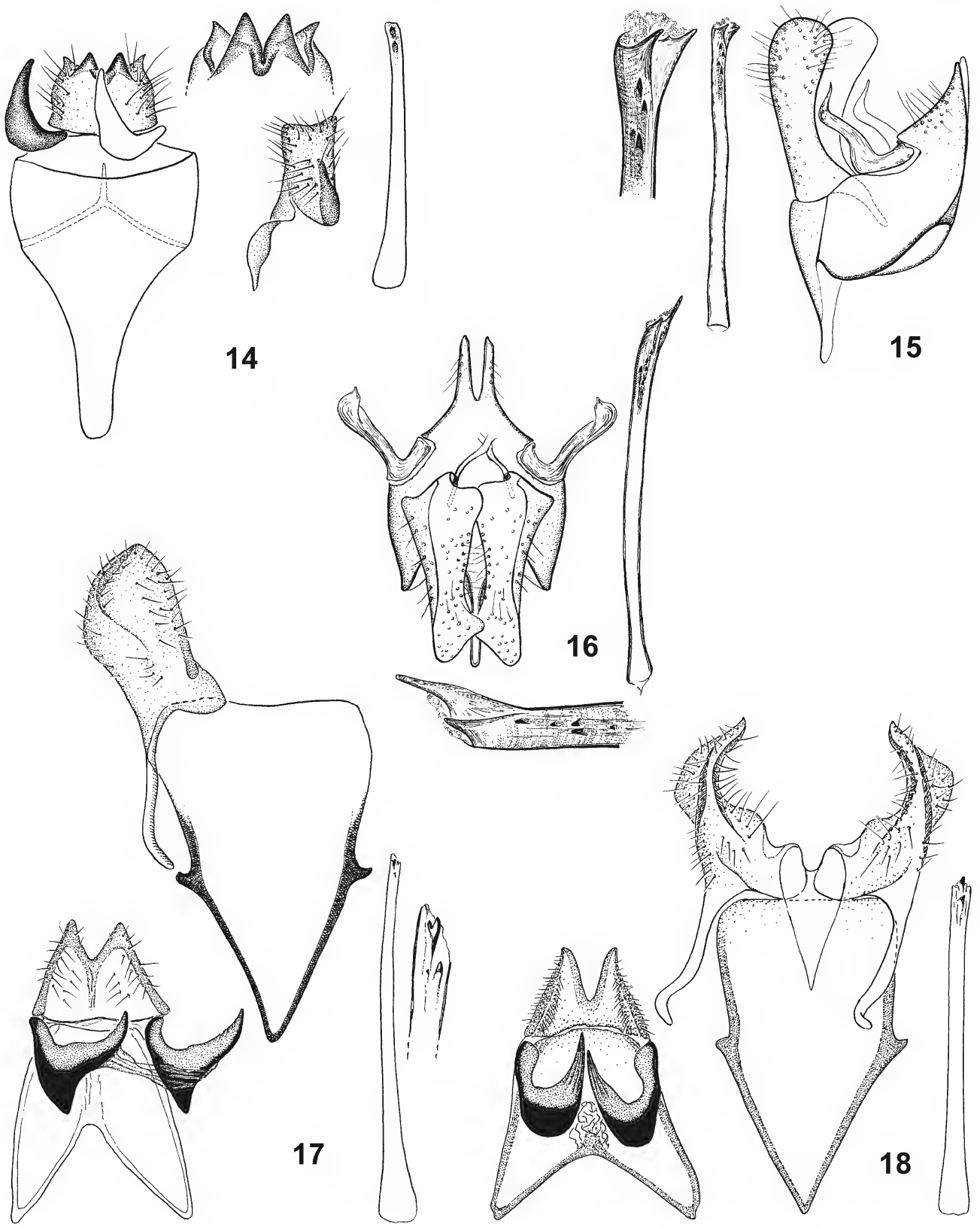
Male genitalia (Fig. 18): Uncus medially with V-shaped incision, the two lobi more or less triangular, with pointed tip; gnathos arms extremely curved at midlength, with pointed tip, broadest in the middle; tegumen broad, with more strongly sclerotised edges; vinculum in the first half square, laterally with a small hook (insertion of apodemes), second half triangular to the pointed saccus, lateral edges more strongly sclerotised; valvae with very long thin apodemes, apically hook-shaped; the shape three-dimensional, costal edge more strongly sclerotised, curved to pointed tip, ventral edge from broad base narrower to apex; phallus as long as vinculum-saccus complex, thin, with two minute thorn-like cornuti.

Differential diagnosis

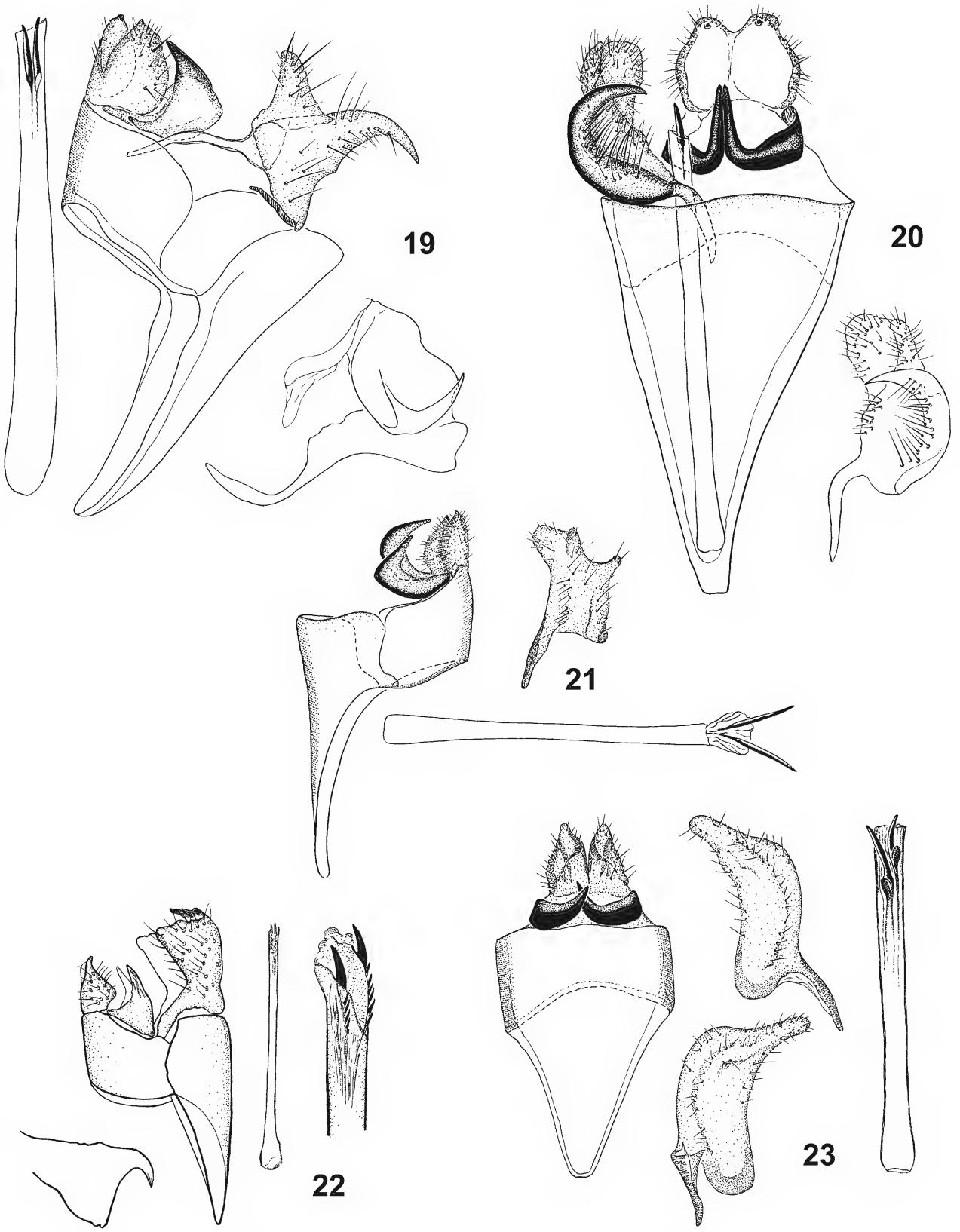
In the male genitalia the shape of vinculum is similar to *R. karsholti*, but the shape of valvae with pointed tip and the curved gnathos arms distinguish the new species from it.

Figs. 1–7. *Reisserita* spp., adults. – **1**. *R. parva*. **2**. *R. chalcopterella*. **3**. *R. luteopterella*. **4**. *R. karsholti* (after GAEDIKE 2009b). **5**. *R. meyi* n. sp., holotype. **6**. *R. zouhari* (after GAEDIKE 2009a). **7**. *R. mauritanica*. – Scales: 2 mm.

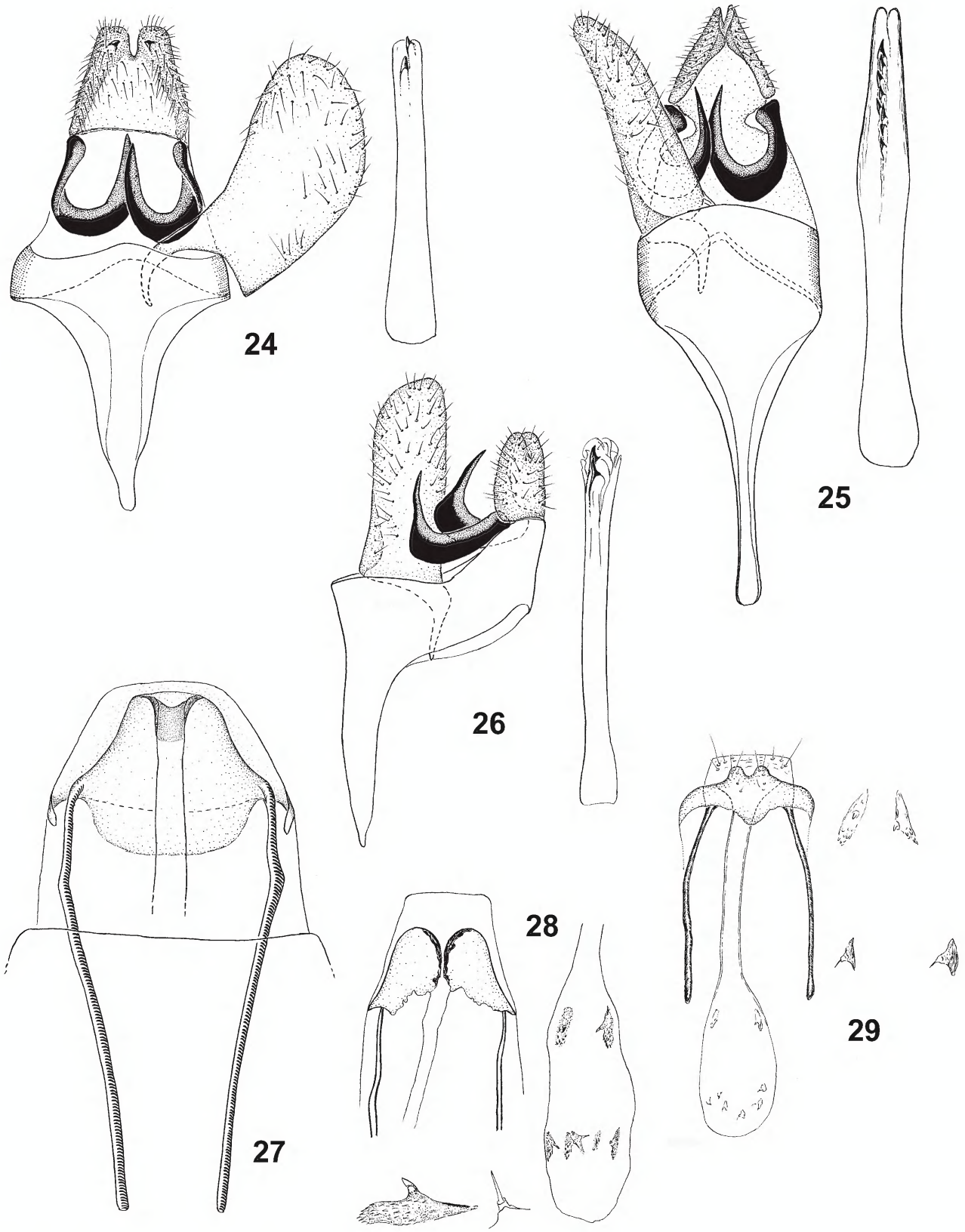
Figs. 8–13. *Reisserita* spp., adults. – **8**. *R. cinnamomella* n. sp., holotype. **9**. *R. oranella*. **10**. *R. bettagi* (after GAEDIKE 2009b). **11**. *R. panormitanella*. **12**. *R. stengeli* (after GAEDIKE 2009b). **13**. *R. leucella*. – Scales: 2 mm.



Figs. 14–18. *Reisserita* spp., male genitalia. – **14**. *R. parva* (after PETERSEN & GAEDIKE 1979). **15**. *R. chalcopterella* (after PETERSEN 1957). **16**. *R. luteopterella* (after PETERSEN 1957). **17**. *R. karsholti* (after GAEDIKE 2009b). **18**. *R. meyi* n. sp.



Figs. 19–23. *Reisserita* spp., male genitalia. – **19**. *R. zouhari* (after GAEDIKE 2009a). **20**. *R. mauritanica*. **21**. *R. cinnamomella* n. sp. **22**. *R. oranella* (after PETERSEN 1957). **23**. *R. bettagi* (after GAEDIKE 2009b).



Figs. 24–29. *Reisserita* spp., male (24–26) and female (27–29) genitalia. – **24**. *R. panormitanella*. **25**. *R. stengeli* (after GAEDIKE 2009b). **26**. *R. leucella*. **27**. *R. parva*. **28**. *R. oranella* (after PETERSEN 1957). **29**. *R. leucella* (after PETERSEN 1979).

5 Key to the North African members of *Reisserita* (male genitalia)

1 Uncus with four pointed lobes. ..... ***R. parva***
– Uncus with two lobes. **2**
2 Uncus with deep incision; gnathos arms long and narrow.. **3**
– Uncus with more or less V-shaped incision; gnathos arms shorter, angled. **4**
3 Gnathos arms subapically angled, with pointed tip; valvae basally nearly parallel-sided, apically rounded; phallus with two oblique pointed tips. ..... ***R. chalcopterella***
– Gnathos arms subapically rounded, with pointed tip; valvae basally broad, narrower in the middle, apex truncated; the one pointed tip of phallus longer than the second one. ..... ***R. luteopterella***
4 Vinculum each laterally with small hook (insertion of apodemes). **5**
– Vinculum without hooks. **6**
5 Gnathos arms knee-shaped at mid-length; valvae lancet-shaped, apex rounded. ..... ***R. karsholti***
– Gnathos arms curved; valvae basally broad, apex pointed... ..... ***R. meyi* n. sp.**
6 Valvae divided into two processi. **7**
– Valvae not divided. **8**
7 Gnathos arms more or less triangular; phallus with two thin cornuti. ..... ***R. zouhari***
– Gnathos arms narrow, angled; phallus with one cornutus.... ..... ***R. mauritanica***
8 Valvae small, parallel-sided, ventral edge with short process. ...**9**
– Valvae larger. **10**
9 Phallus with two thin cornuti. ..... ***R. cinnamomella* n. sp.**
– Phallus with two curved cornuti and two rows of minute cornuti. ..... ***R. oranella***
10 Valvae with convex costal edge and concave ventral edge; phallus with two hook-shaped cornuti. ..... ***R. bettagi***
– Valvae more or less parallel-sided, with broadly rounded apex; phallus with a row of cornuti or with two short straight cornuti. **11**
11 Uncus lobes on inside with a small strongly sclerotised tooth; valvae spoon-shaped. ..... ***R. panormitanella***
– Uncus lobes without sclerotised teeth; valvae lancet-shaped or parallel-sided. **12**
12 Phallus with a row of strongly sclerotised thorn-like cornuti. ..... ***R. stengeli***
– Phallus with two short hook-shaped cornuti. ..... ***R. leucella***

6 Checklist of the species of *Reisserita* from North Africa

The distribution records are based on material studied by the author.

R. parva Petersen & Gaedike, 1979 (Figs. 1, 14, 27) – Morocco, Spain
R. chalcopterella (Zerny, 1935) (Figs. 2, 15) – Morocco
R. luteopterella Petersen, 1957 (Figs. 3, 16) – Morocco
R. karsholti Gaedike, 2009 (Figs. 4, 17) – Morocco
R. meyi n. sp. (Figs. 5, 18) – Morocco
R. zouhari Gaedike, 2009 (Figs. 6, 19) – Egypt
R. mauritanica (Baker, 1885) (Figs. 7, 20) – Algeria, Tunisia, Malta
R. cinnamomella n. sp. (Figs. 8, 21) – Morocco
R. oranella (Petersen, 1957) (Figs. 9, 22, 28) – Algeria
R. bettagi Gaedike, 2009 (Figs. 10, 23) – Morocco
R. panormitanella (Mann, 1859) (Figs. 11, 24) – Algeria, Tunisia, Sardinia, Sicily
R. stengeli Gaedike, 2009 (Figs. 12, 25) – Morocco
R. leucella (Turati, 1926) (Figs. 13, 26, 29) – Libya

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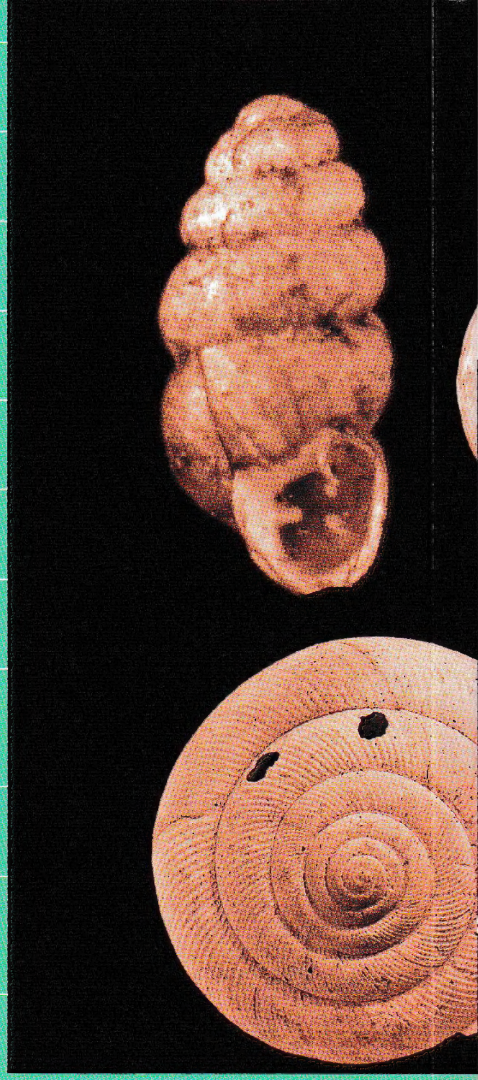

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